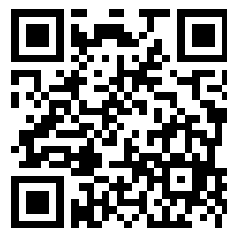

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Journal
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Original Communications.

THE TREATMENT OF ANAEROBE-INFECTED WOUNDS
WITH LACTIC ACID.

PRELIMINARY NOTE.

BY MAJOR L. W. HARRISON, D.S.O.
Royal Army Medical Corps.

THE micro-organisms of the gas-brand and malignant œdema series have caused so much loss of life and mutilation during this war that no excuse is required for the following note, though under other circumstances its publication would have been delayed till it was better grounded.

Whilst engaged recently at No. 14 General Hospital on bacteriological work which included the flora of septic wounds, it occurred to me that since anaerobes of the gas-brand and malignant œdema series degenerate, fail to spore and do not liberate toxin in a distinctly acid culture medium the treatment of wounds in such a manner as to make distinctly acid to litmus the discharge in which these organisms abound would prevent and arrest their poisonous effects. There seemed to be better grounds for formulating such an hypothesis in the case of what we may shortly term malignant anaerobes than in that of ordinary pathogenic infections, since in the former the microbes largely manufacture their toxin in the wound (quite possibly from the dead matter in which they flourish), and invade the tissues beyond the wound only when these are almost devitalized by concentrated toxin. One can easily

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liken a type of septic thigh wound which has been very common during this war to a culture flask in which multitudes of malignant anaerobes are flourishing in dead protein. The difference is that while in the former fresh culture medium (i.e., serum) of the correct reaction for maintaining the virulence of the organisms is constantly being poured into the wound cavity, in the ordinary culture flask the medium is generally becoming more and more acid and, apparently *pari passu*, the organisms less and less virulent.

An opportunity of testing this theory was first afforded me by Lieutenant H. W. Parnis, R.A.M.C., in the following case. A soldier suffering from a very severe septic compound fracture of the thigh was very ill constitutionally. The wound was very foul and contained myriads of malignant anaerobes, though it had been opened up freely and treated with peroxide in the usual way. At the morning dressing a ten per cent solution of lactic acid was syringed into the wound, one aperture of which was temporarily plugged so that the cavity would hold the acid better. The same evening the patient's temperature had dropped from 103·4° F. in the morning to 100° F., and there was a very marked general improvement. For three days after this the acid was used rather sparingly as the supply was limited, and meantime the patient only maintained his first improvement. As the pus was then amphoteric in reaction and anaerobes were still numerous, it was decided to risk failure of further supplies and treat the wound thoroughly with the remainder of the acid in stock. Coincidentally with the maintenance of an acid reaction of the pus the improvement recommenced, two days later the wound was granulating and the micro-organisms were very considerably reduced, while the patient was well established on the road to recovery.

In the next case more careful bacteriological observations were made. A patient was admitted to Lieutenant W. H. Parry's ward, on transfer from a clearing hospital, with a severe wound which had necessitated amputation at the junction of the upper and middle third of the right upper arm. The flaps, which had as usual been left open, were oedematous and almost black, the oedema spreading upwards over the shoulder and down almost to the angle of the scapula. The stench from the wound was very bad, and the patient was blanched and very feeble from loss of blood and toxæmia. The pus, which was amphoteric to litmus, was swarming with gas-brand anaerobes and cocci, and the former were sporing freely. Temporary Major A. E. Johnson, R.A.M.C.,

disarticulated the remainder of the arm and treated the stump with ten per cent lactic acid, some of which he injected into the surrounding tissues. Eight hours later the pus was found to be acid, and on microscopical examination the anaerobes were extremely scanty and none of them free or sporing, all which were seen being enclosed within phagocytes. On the following day it was generally agreed that the patient was better constitutionally. No examination of the pus was made, but on the day after this it was again tested as it was obvious that the patient was worse. The pus was then amphoteric and again swarming with anaerobes, with the usual cocci. The acid was accordingly pushed (four hourly dressings) with the object of keeping the reaction of the pus constantly acid. Twenty-four hours later it was again found to be acid, and again the anaerobes were very scanty. Roughly comparing the number on this with that found on the previous day the latter was fifty per field and the former two. Coincidentally, the patient's general condition showed a marked improvement. This improvement was maintained, and five days after the first application of the acid the wound was granulating. As sloughs separated the patient complained of smarting when the lactic acid was applied. This was no greater than that resulting from the peroxide with which the wound was first swabbed, but in order to lessen the pain, and also for its effect on the cocci in the secretion, carbolic acid was mixed with the lactic acid to a strength of two and a half per cent. I left the hospital just after this innovation and cannot speak as to its effect. Unfortunately this patient died of secondary hæmorrhage about five days after I left.

It may be asked, why waste a reader's time over the recital of such an unconvincing story? But those who witnessed the effect of the lactic acid on these two cases and saw the slides of the second, believed with me that it had certainly hampered the activity of the anaerobes to an extent not witnessed under other treatments.

In a letter received recently from Lieutenant J. F. Smith, R.A.M.C., who very kindly promised to report to me the results of any further trial of lactic acid, he said, "Morris has had a very septic (anaerobic) compound thigh which did marvellously well on lactic acid. Parry has used it on several cases, but they were not sufficiently bad to afford a good test."

If further trial shows that lactic acid acts in the manner suggested above, it should not be necessary to open out wounds so freely as is usual at present, but treat the cavity as a culture

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flask, filling it from time to time with the lactic acid. It is possible that a more concentrated solution would act more quickly, and still be tolerable to the patient. A weaker solution is certainly not so efficacious.

It is essential in the treatment of wounds with lactic acid that pus from the depths of the wound should be tested with litmus at each dressing, since if the reaction is not distinctly acid the lactic acid has not been applied in such a manner as to fulfil its object. I have no evidence that lactic acid is of any use against cocci.

PRELIMINARY OBSERVATIONS ON THE USE OF AN AUTOGENOUS LIVING VACCINE IN THE TREAT- MENT OF ENTERIC FEVER (SIX CASES).

BY MAJOR E. A. BOURKE, LIEUTENANT IDRIS D. EVANS, AND
LIEUTENANT SYDNEY ROWLAND.

Royal Army Medical Corps.

HAVING recently treated cases of enteric fever with vaccine, and obtained satisfactory results, it occurred to one of us (S. R.) that better results might be obtained by employing autogenous living vaccine for each case. The clinical notes and temperature charts of our first successive cases treated by this method, and the satisfactory results obtained, will, we hope, lead to this method being given a more extensive trial. Our cases have demonstrated that this method of injecting living bacilli in suitable doses is perfectly safe. The vaccine was injected subcutaneously, as a rule in the pectoral region, and was followed by very slight local reaction, but marked general reaction. No local or general complications were observed. The injection, as a rule, was followed by a rise of temperature within the first few hours followed by a marked fall within twenty-four hours of inoculation. Careful notes were made and in our minds there is no doubt that this treatment has a beneficial effect, and tends to cut short the duration of the disease. It promotes perspiration and the aspect of the patient is undoubtedly brighter after injection and the tongue becomes much cleaner.

The diagnosis was verified in all cases by blood culture. Several of the cases on admission to hospital gave one the impression that the attack would be a severe one; in this opinion, our consulting physician, Sir Wilmot Herringham, agreed. To him also we are indebted for valuable suggestions as to dosage, and frequency of administration of the vaccine.

PREPARATION OF THE VACCINE.

The disease was in each case diagnosed by means of blood culture. For this purpose 5 c.c. of blood was drawn from the arm and immediately transferred to one per cent sodium taurocholate. From this a broth culture was prepared and the purity and identity of the growth verified by agglutination and sugar fermentation tests. The broth culture was reinoculated into fresh broth and

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itself constituted the vaccine. No further preparation whatever was employed. The age of the culture used was generally eighteen hours, and the number of bacilli contained in it was obtained by a direct method of counting which has been previously described by one of us. The average number of organisms given for a dose ranged from 60,000,000 to 300,000,000.

EFFECTS OF INOCULATION.

The local reaction following injection was surprisingly small, and was far less than is commonly seen after a prophylactic inoculation using a killed vaccine. The general reaction on the patient was on the other hand very marked. A sharp rise of temperature was always observed. Frequently this was accompanied by profuse perspiration.

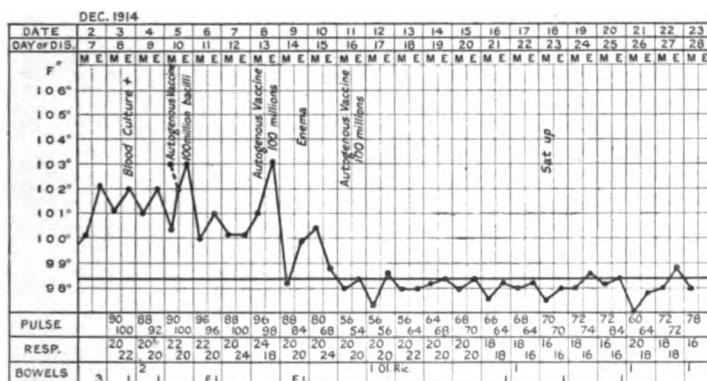
These preliminary observations have demonstrated that a living culture of the typhoid bacillus can be injected subcutaneously into enteric patients, not only without any deleterious effects whatever, but as far as the few cases show with decided favourable influence on the course of the disease. Much remains to be worked out. The dose and spacing of the dose will require many further cases to determine. In conclusion, it is desired to draw attention to the point of view that has dominated these experiments. The vaccine treatment of enteric has many advocates. It is the common experience of bacteriologists that all antigens are very delicate substances, and any physical agency employed to kill the enveloping bacillus acts deleteriously on the contained antigen. If, therefore, the vaccine treatment of enteric is of use when employing a killed vaccine, it should be of still greater use when the living vaccine is used. More especially will this be the case if the vaccine is autogenous. It has been the work of one of us during the last few years to investigate the antigens of the plague bacillus. In the case of this organism it has been found that the strain of organism used for the preparation of an antigen is most important. In the cases above related the strain used was in each case the strain isolated from the patient.

It is hoped that these investigations will be continued by others.

AUTOGENOUS VACCINE CASE.

Private G., No. 6609, H. Co. Roy. Welsh Fus., aged 23.—Never been inoculated for enteric. November 27: Headache and feeling out of sorts. November 29: Had to fall out on parade and report sick. December 2: Admitted to hospital. On examination patient

was tired and listless; pupils large; tongue dry, glazed, brown fur, tremulous; considerable cough, slight expectoration; breath fetid; abdomen no tumidity or tenderness; reflexes diminished; a few spots, marked diarrhoea with occasional vomiting after milk; spleen enlarged; knee-jerks exaggerated; chest breathing harsh moist rales; no dullness; promised to be a moderately severe case. December 3: *Blood culture positive*. December 5: Abdomen more

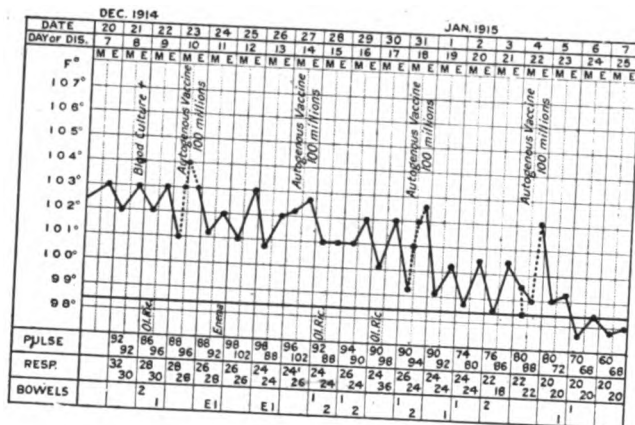


tumid, spots gone; 12 noon $\frac{1}{2}$ c.c. vaccine; evening temperature 103° F. December 6: Slight local reaction, now almost gone; temperature 100° F., looks flushed, complains of headache; abdomen tender, more spots. December 8: Feeling better, sleeps well. December 11: 8 a.m., temperature 98° F.; $\frac{1}{2}$ c.c. vaccine; 6 p.m., temperature normal. December 12: Considerable local reaction; temperature 97.4° F.; general condition excellent, was able to read newspapers. December 18: Temperature normal; general condition excellent; got up for two hours; was a bit weak on his legs; convalescent. One cubic centimetre vaccine contains 400,000,000 bacilli.

Serjeant C., No. 9443, 2nd Roy. Irish, aged 25.—Never been inoculated. December 20: Admitted to hospital; headache and general malaise; no definite symptoms; drowsy; face flushed; tongue moist, light brown fur; abdomen slightly distended and tympanitic, numerous rose spots. December 23: *Blood culture positive*; spleen enlarged; slight local reaction from autogenous vaccine; patient drowsy and does not feel so well. December 24: Patient feels very well and is much brighter; during the night has perspired freely. December 27: $\frac{1}{2}$ c.c. vaccine; 5 p.m., complains of severe

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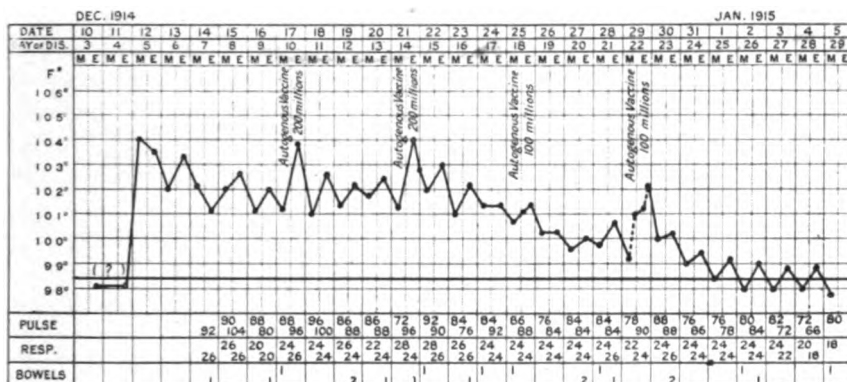
pain in left iliac fossa, which he states has been coming on ever since he has been inoculated: no signs suggesting any complications; same night 1 c.c. omnipon. December 28: Patient has had a good night; abdominal pain all gone, feels well, new patch of rose spots; tongue still coated and tremulous. December 31: $\frac{1}{2}$ c.c. vaccine. January 1: Moderate local reaction, temperature dropped considerably; patient had a good night and is in good



spirits; perspired freely. January 4: $\frac{1}{2}$ c.c. vaccine. January 5: More local reaction than usual, but not as much as is usual after a prophylactic dose of Wright's vaccine; did not sleep so well and perspired freely; seems better this morning, says he feels well; tongue clean; no abdominal signs or symptoms; from this date convalescent, discharged to base January 7, 1915. One cubic centimetre vaccine contains 400,000,000 bacilli.

Serjeant A., No. 21681, A.S.C. 9 Co., aged 30.—December 7: Sudden attack of cold shivering and malaise; pains in back and headache; admitted to hospital. December 14: Temperature 101.4° F.; tongue thick white fur turning brown; patient is bright and talks well; chest increased resonance and vocal fremitus over lobe of right lung; heart increased second aortic sound; abdomen no pain or gurgling; rose spots; constipated. December 15: *Blood culture positive*. December 17: 8 a.m., temperature 101° F., autogenous vaccine $\frac{1}{2}$ c.c.; 6 p.m., temperature 103.8° F. December 18: 8 a.m., temperature 101° F., one more spot. December 21: Temperature has continued about 102° F.; patient seems bright; $\frac{1}{2}$ c.c. vaccine. December 22: No local reaction;

slight general reaction temperature; restless. December 24: Fairly comfortable; tongue cleaning; since vaccination has perspired very freely. December 25: $\frac{1}{4}$ c.c. vaccine. December 26: No local reaction; patient cheerful and says he feels better.

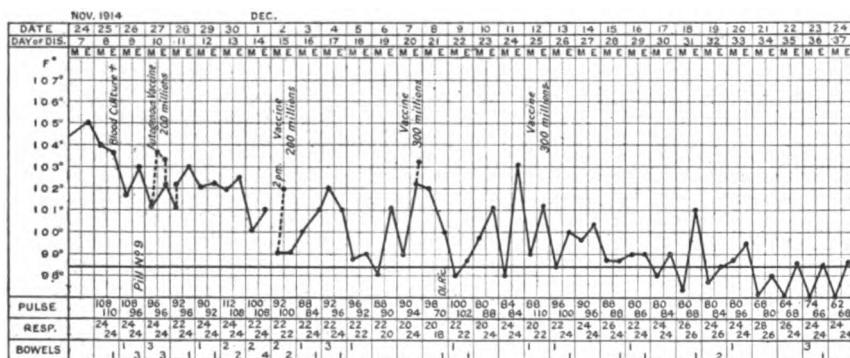


December 29: $\frac{1}{4}$ c.c. vaccine. December 30: Had an excellent night, very slight local reaction; tongue moist and clean; wants to get up. January 1: Patient feels perfectly fit; temperature normal; tongue clean; no abdominal symptoms. January 2: Convalescent. One cubic centimetre vaccine contains 400,000,000 bacilli.

Driver F. B., No. 17703, A.S.C. 9 Co., aged 30.—November 22: Began to feel out of sorts, headache and malaise. November 25: Admitted to hospital; patient was flushed, tired and restless; severe headache and pain in back and legs; appearance of being a severe case with co-existent bronchitis; spat up a little blood; perspires freely and complains of thirst; eyes sunken; tongue tremulous; breath fetid; tongue coated with dry white fur; has not vomited nor bled from nose; restless with a tendency to delirium and sleeplessness; heart sounds normal; pulse 108, and soft; temperature 105° F.; spleen not enlarged; no pain or distension in abdomen, no caecal gurgling; no spots. November 25: *Blood culture positive*. November 27: Temperature falling, 102° F. at 6 p.m.; diarrhoea has commenced; 7 p.m. $\frac{1}{4}$ c.c. autogenous vaccine injected into left arm; 8 p.m., temperature 103.8° F., pulse 94; 12 midnight, temperature 101.2° F., pulse 104. November 28: 7 a.m., temperature 102.8° F., pulse 104; 8 a.m., temperature 103° F., pulse 92; condition much same, very slight local reaction. November 29: Did not sleep, some delirium; does not seem so well; urinary incontinence.

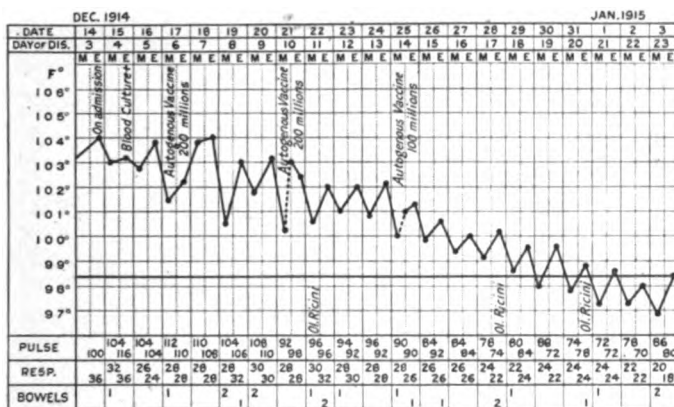
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November 30: Temperature same; feeling brighter and had a good night. December 2: Temperature falling to 99·2° F., condition improved; 12 noon, 0·5 c.c. vaccine; 2 p.m., temperature 102° F.; 6 p.m., temperature 99·2° F. December 3: Slight local reaction; condition improved; still rather thick in the head. December 4: Very heavy and dull; tongue tremulous; still has a bad cough. December 6: 8 a.m., temperature normal; greatly improved; tongue cleaner and less tremulous; no further involuntary passage of water or stools. December 7: 8 a.m., temperature 99° F., has not passed water since last night, pain over bladder which is distended, hot fomentations no effect, catheter passed five pints urine drawn off; 3 p.m., temperature 102·6° F., 0·75 vaccine; 3 p.m., temperature 102·6° F.; 6 p.m., 103·8° F. December 8: Temperature 102° F., marked reaction after vaccine; no local reaction, though temperature went up pulse remained the same; has had a



restless night but has not wandered in mind. December 9: 8 a.m., temperature normal; slept well and marked improvement; bowels open naturally, still being catheterized; has an old stricture which always gives trouble when he is ill. December 10: Seems tired but sleeps well. December 11: Feeling better; tongue steady; urine clear; no signs of cystitis; 8 p.m., temperature 103° F. December 12: 8 a.m., temperature 99° F., $\frac{3}{4}$ c.c. vaccine; no symptoms to account for temperature; complained of feeling cold but had no rigor; 6 p.m., temperature 101·2° F. December 13: 8 a.m., temperature normal; feels distinctly brighter and talks; still unable to pass water; since this his temperature has remained about normal with exception of a rise on December 18 after some solid food. One cubic centimetre vaccine contains 400,000,000 bacilli.

Private D., No. 26473, No. 9 Co., A.S.C., aged 25.—December 10: Felt ill with headache; pains in shoulders and back; reported sick December 12; pains gone; pain now in stomach. December 14: Admitted to hospital, temperature 104° F.; looks dull and listless; tongue dry brown fur; tremulous; slight bronchial catarrh; promises to be a severe case with marked chest symptoms. December 15: *Blood culture positive*. December 17: 8 a.m., temperature 102° F.; $\frac{1}{2}$ c.c. vaccine; at 6 p.m. temperature 102.4° F.

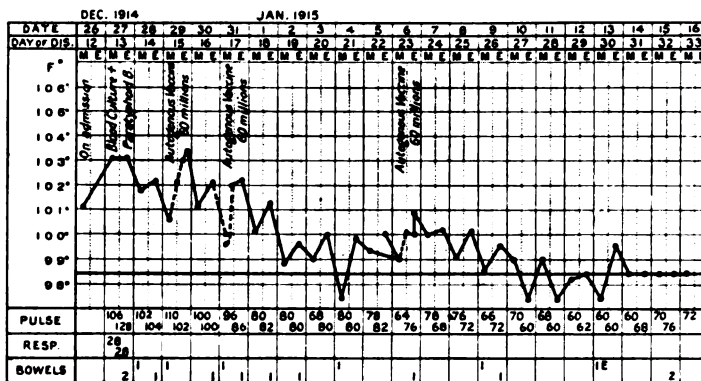


December 18: Temperature 102.8° F. December 21: Temperature 100.4° F.; $\frac{1}{2}$ c.c. vaccine; bright and cheerful; still has some chest symptoms. December 22: Had a good night; feels very well this morning; slight local reaction. December 25: $\frac{1}{4}$ c.c. vaccine, slight local reaction. December 30: Feels perfectly well and is clamouring for food; wants to get up; temperature normal; tongue moist and quite clean; no abdominal symptoms. December 31: Convalescent. One cubic centimetre vaccine contains 400,000,000 bacilli.

Private A. S., No. 9761, 1st Lincolns, aged 19.—December 23: Reported sick with bad headache; pain in stomach and diarrhoea; diarrhoea has always lasted a week. December 26: Complains of headache, diarrhoea and malaise; tongue moist and covered with white fur; breath fetid; vomited a few times before admission. December 27: Very drowsy and listless, unable to sleep; no appetite; abdomen distended and tympanitic; tenderness over left iliac region, and tenderness and distension over splenic area; splenic dullness not enlarged; few rose spots. *Blood culture positive*. *Bacillus paratyphosus* B. December 28: Had a restless night, still drowsy and cannot be persuaded to take an interest in anything;

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one fresh spot. December 29: Seems a little better; still restless and sleeps badly; given $\frac{1}{10}$ c.c. autogenous vaccine (60,000,000); blood count 8,000; considerable local reaction; had a better night. December 30: Distinctly brighter; tongue quite clean and not tremulous; still some local reaction; typical enteric stools. December 31: $\frac{1}{10}$ c.c. autogenous vaccine 11 a.m.; by 6 p.m. some local reaction. January 1: Patient feels a little better; there is still some abdominal tenderness and a fresh crop of rose spots has



appeared; diarrhoea has ceased. January 4: Patient looks well and feels much better; abdominal tenderness and distension have disappeared; tongue cleaner and not tremulous. January 6: Temperature down but unsteady; $\frac{1}{10}$ c.c. vaccine given. January 7: Patient has had a poor night; considerable local reaction, but he seems bright this morning. January 8: Patient much improved; tongue almost clean; no abdominal symptoms: temperature dropping. January 9: Temperature normal. From this date patient convalesced rapidly.

A GOSSIP ON WORDS FROM OUR JOURNAL.

BY COLONEL R. H. FIRTH.

THIS is not a professional article, neither can it be called scientific in the ordinary acceptation of that term; it is rather literary or informative and, on those grounds alone, claims a place in our Journal. Its inception arose from an argument over cards at mess one evening as to the origin and meaning of the words "ruff" and "trump," which I ventured to say arose from an old French card game called *ruffe* or *triomphe*. The argument then drifted to the origin of the pips on the cards and why we called certain symbols spades and clubs. One man remarked that the spade pip might by courtesy be called a spade, but that he failed to know of any club with three heads. I ventured to suggest that while the emblems we use on our cards are the French symbols of diamond, heart, pike and trefoil or clover, we have given to the two latter the names for the pips placed on Italian and Spanish cards, which, instead of pike and trefoil, are sword (*spada*) and mace (*bastone*), hence our appellations of spade and club to what are meant really to be pike and trefoil. Etymologically, both the English word *spade* and the Italian word *spada* go back to the Græco-Latin word *spatha*, meaning a flat or blade shaped object, from which also comes our term *spatula*. The outcome of the prominent part taken by me in controlling the argument was that an officer, familiar with my predilection for scribbling, remarked, "Colonel, you seem to know a lot about philology, why don't you write an article, it would make interesting reading." At first, one did not think seriously of the suggestion but, like most men who serve in India, having many idle hours, the idea occurred to me that I might find amusement in putting the following pages together. What follows is really so much chit-chat or gossip on words in common use, professional and otherwise, and a selection is made from odd numbers of our Journal, taking words more or less at haphazard from its pages.

One calls this article a *gossip* on words and yet, used in the sense of irresponsible talk or tittle-tattle, this word now carries a meaning having no relation whatever to its etymology and first meaning. Chaucer spelt it as *godsib*, showing that it is a compound word made up of the name of God and of the old English word *sib*, still current in the north and in Scotland, which means akin or related. Those who, like myself, know the rustics of

Hertfordshire and Hampshire, are familiar with the custom in some parts of those counties by which the sponsors or godparents at a baptism are called "gossips." We have there a correct employment of the word in its proper and original use, meaning that those who stood sponsors to the same child, besides contracting spiritual obligations on behalf of the child, contracted also spiritual affinity one with another. They became *sib* or akin in God and thus godsibs or gossips. Sir Thomas More, in 1533, wrote: "I have none affinitie eyther by gossiped or bi mariage"; similarly, Evelyn, in his diary of 1649, says, "the parents being so poore that they had provided no gossips." From the older concept and usage of the word, we can see how it became applied to all familiars and intimates and, later on, came to signify such idle talk as would be heard in the intercourse of such people.

Taking up and opening a number of our Journal casually, the first word to catch my eye was *trephine*, the French modification of the old English term *trafine*, employed by Woodhall when he originated the instrument in 1639, from the three ends thereof or *a tribus finibus*. The old-fashioned word *trepan* was derived from the Greek *trypanon*, an auger or piercer. Curiously enough, an old sporting word for trap was *trepan*, and occurs in the following lines from *Hudibras*: "Some by the nose with fumes *trepan* 'em, As Dunstan did the devil's grannam." On the next page, the word *Seidlitz* attracted attention. How many realize that the familiar name of a banisher of morning headache goes back to 1815, and that the artificial aperient water gets its origin from the name of a village in Bohemia where there is a spring impregnated with magnesium sulphate and carbonic acid, although the actual *Seidlitz* powder contains no Epsom salt. Dickens, writing in 1837, mentions in his "Pickwick Papers" the clerk who mixed a *Seidlitz* powder under cover of a desk lid.

Next the word *zero* catches one's eye. It is an interesting word because it and *cipher* are really doublets, both of them coming from the same Arabic root *cifr*, signifying nothing. The mediæval Latin word *zephyrum* connects the two forms. This question of doublets is rather interesting, as words of the kind reveal many etymological relationships which are not to be suspected at first sight. Thus, a few lines farther on, one sees the words *drill* and *twill* in reference to some clothing. The former comes from the German *drillich*, which is a linen cloth of three threads, and itself but an adaptation of the Latin *trilix* from which we get *trellis*. The older and Anglo-Saxon word *twill* seems cognate with the German *zwilch* or *zwillich*,

meaning linen woven with a double thread. Another doublet on the same page is *admiral*, which comes through the French from the Arabic *amir* or *emir*, and in the oriental *amir al bahr* or emir of the sea we recognize easily the parent of our English use of the naval title. So again, the word *serjeant* is practically a doublet of *servant*, the present participle of the French verb *servir*. Even the familiar word *soldier*, which one finds close by, is full of suggestion. Soldier was formerly pronounced *sodder* or *sowder*, and comes really from the French verb *souder* and itself derived from the Latin *solidare*, to consolidate. It is represented in mediæval Latin by *solidarius*, corrupted in English of the fifteenth century to *sowder*. In Italian and German we have *soldato* and *soldaten*, or the men given a sol or sou or halfpenny, that is paid men, a meaning which appears to attach to the Latin *solidus* and *solidarius*, and to the obsolete French and German terms of *soudard* and *soldner*, which now are used only in a depreciatory sense.

The turn of a page shows the word *midwife*, the history and etymology of which is far from clear. The syllable *mid* either has an adjectival or a prepositional sense, while *wife* probably has its old meaning of woman. By the former view, the primary sense of the word *midwife* would be a woman by whose means the delivery is effected; by the latter view, it means a woman who is with the mother at the birth. The latter seems the more likely, though analogies are wanting for this mode of formation of the word. Close by, occurs the term *enceinte*; in old days this was written *inseint* as appears in a will of 1598, "Yf my wife be pryvyment inseinted with a manchild." Etymologically, the term means ungirdled, from *in* and *cincta*, and in this sense is opposed to the meaning of an enclosure as employed in the phraseology of fortification. A few lines farther on, one sees the word *pantaloons*, which is probably Venetian in origin, as many Venetians had the name Pantaleone after one of their favourite saints. The application of the name passed readily to the characteristic Venetian hose, and the "lean and slippered pantaloons" was originally one of the stock characters of the old Italian comedy. The reference to this word tempts one to say that *knickerbocker*, though one does not find it in our Journal, got its name from one Diedrich Knickerbocker, the pseudonym under which Washington Irving wrote his "History of old New York," in which the early Dutch inhabitants are described as wearing baggy knee-breeches, to which the name of knickerbocker still pertains. The somewhat uncommon term *moxa* next attracted attention, in reference to the application of a counter-

irritant. The origin seems to be from the downy covering of the dried leaves of the *Artemisia moxa*, which gained repute in England at the close of the seventeenth century as a counter-irritant for gout and rheumatism. In time, the word came to mean any substance used like *moxa* for burning on the skin, as is seen from such a quotation as the following, "a small pad was made with spider's web and placed on the corn; it was then lighted and left to burn as a moxa."

One has just written the word *rheumatism*; the origin of this name for a familiar disability carries us back to the term *rheum*, evidently connected with the Greek *reuma*, meaning a stream or flow, and indicative of an excessive or morbid defluxion of any kind. In "The Task," by Cowper, occurs the following line, "His sparkling eye was quenched by rheums of age," which is a peculiarly apt description of many an old man. Similarly, Milton in his "Paradise Lost" tells of "dropsies and asthmas and joint-racking rheums." This suggests the modern rheumatism as meaning, even then, a disease of which inflammation and pain of the joints are a prominent feature. The connecting link between the two uses or meanings is to be found in the popular belief that the joint pains are due to a defluxion of rheum. Some reader may recall Burns's well-known lines "To the Toothache," wherein he says, "When fever burns or ague freezes, Rheumatics gnaw or cholic squeezes." We get there the colloquial use of rheumatics as a noun in the plural, meaning rheumatic pains or acute rheumatism. In vulgar parlance, the singular noun of the *rheumatiz* means rather the chronic form of the complaint. A few lines on, one finds the old and interesting word *potion*. I have been unable to trace its history, but can give the three following quotations which, to doctors, are suggestive of thought. The first is, "He hadde diede anoon, but that he receyvede a pocion of his phisicion"; the second is a quaint warning, "If a man may be cured with dyet and pocion, let there not be ministered any chirurgerie"; while the third is most pessimistic and unflattering to ourselves, "neither pocions nor phisicions can do more than postpone the evil hour." Having just used the word *physician*, which means to us a person practising the healing art, the remark suggests itself that an old and obsolete meaning of the word is that of a student of natural science or, as we should say now, a physicist; similarly, an obsolete meaning of the term *physicist* is that of one versed in medical science. Plato's idea of the physician is that of one "to cure the disorders of which luxury is the source." That is an aphorism

anticipating views so well carried out by Abernethy, many hundreds of years later. In an Ordinance issued in 1542 by Henry VIII, occurs the following curious and suggestive caution: "The Physitions doe not fall to cuttinge except all other meanes and wayes afore be proved." This implies some conception in those days of the difference between a physician and a surgeon. Passing to Shakespeare's time, we find him putting the following caustic words into the mouth of the doctor in *Macbeth*: "This disease is beyond my practice, more needs she the divine than the physician." Lanfranc, writing in 1400, says, "O Lord, whi is it so greet difference bitwixe a cirurgian and a phisicion." In 1612, we find Holles saying, "The more learnt sort are justly stiled by the title of phisicion, and the more experienced sort are called chirurgions." Certainly, a quaint way of drawing a distinction between the theoretical and the practical man.

The use of the word *quaint* in the above paragraph prompts one to remark that this word now conveys the idea of something which is unusual. This is the exact opposite of its original meaning, which was something familiar and well known, as it comes from the old French *cointe* and *acointier*, to acquaint or make known, and clearly derived from or related to the Latin word *cognitus*. At one time the word seems to have implied pretty or trim, as shown by Shakespeare's line in "*Much ado about Nothing*" where he says, "For a fine, quaint, graceful and excellent fashion, yours is worth ten on't." A turn of the page presents the word *cheerful*, of which the true and original meaning is lost. In early or middle English, the word *cheer* meant face, probably through the late Latin *cara*, a face, or the Greek *kara*, a head; so that when we say a man has a cheerful face, we say really that he has a face full of face. The facial meaning of cheer is apparent in the line from "*A Midsummer's Night Dream*," where Shakespeare says, "All fancy sicke she is and pale of cheere." Even now, the French say *faire bonne chère*, or make a good face of it. We sometimes use it in the same sense when we say, "come cheer up," but it is curious how, in other ways, we have twisted the meaning round, till cheer now means usually with us the substantial advantages which a pleasant countenance promises or suggests. Another word which has acquired a new and opposite meaning is *restive*. In daily life, we apply it to an animal which fidgets or will not stand still, but as a matter of fact, it means an animal or object which will do nothing but stand still. Modern French has *rétif*, from the older words *restif* and *rester*, to remain, and the Latin *restare*. The old

word meant stubborn, and the Scottish term *reist* has much of that meaning now. Sir Walter Scott in "The Monastery," says, "Certain it was that Shagram reisted, and I ken Martin thinks he saw something." Even Dryden employs the word *restive* as having the sense of sluggish in the lines: "So James the drowsy genius wakes of Britain, long entranced in charms, Restive, and slumbering on its arms." The same meaning is apparent in the expression *rusty* bacon, where *rusty* is cognate with the old word *reusty*, used of meat that has been kept or stood too long.

The word *sentry* catches the eye next. This common word has an interesting history, and, like many other military names referring to an action, applies first to the building or station in which the action is performed, then to a group of men thus employed, and finally to the individual soldier. Thus, the Latin word *custodia* means a watch-tower, the watch as a collective group, and the watchman as an individual. A sentry means to us a single soldier, but formerly it meant a band of soldiers, for Milton writes, "What strength, what art can then suffice, or what evasion bear him safe Through the strict senteries and stations thick of angels watching round?" In still earlier times it seems to have meant a watch-tower, and we, even now, employ the phrase "to keep sentry." Really the term sentry is but a contracted form of the word *sanctuary*, and in Skinner's "Etymologicon," written in 1671, the two words *centry* and *sanctuary* are written as synonyms. The following from Pasquil's "Apologie," written in 1590, shows aptly how in the sense of sanctuary, the word sentry was used; "He hath no way how to slyppe out of my hand, but to take sentrie in the Hospital of Warwick." The French word *guérite* for a sentry box is derived from the old French verb *garir* or *guérir*, to save, and from which comes our word *garrison*. In mediæval French, *guérite* meant a refuge or sanctuary, or some place of safety built on high; it is to this latter sense that we owe probably our word *garret*. Modern French has still the verb *guetter*, to lie in wait for, and *guet*, meaning the watchman. The real difficulty about the etymology of sentry is due to lexicographers mixing it up with *sentinel*, which comes from the Italian. The two words are quite distinct, and probably, if the French had not borrowed *sentinelle* from the Italian, their modern term for a sentry would be *guérite*.

We talk of *dressing* a wound and order our men on parade to *dress* by the centre, right or left: in the former case we use the word in the old sense of putting in order, which goes back to early times, but in the second case we employ it to form in proper

alignment, a sense which came into use only in 1800. The word *idle* next arrests attention; we use it as meaning lazy, but originally it meant empty or void. Thus, a writer of 1225 says, "To whomso is idel of God"; again another writer of the same period remarks, "He is ful of zennes and ydel of alle guode." One has just used the word *empty* as meaning the reverse of full, yet even that word had another meaning in old English, and signified both leisure and the unmarried state; possibly the notion was that to have ease or leisure or to be without a wife was one and the same fortunate state. The turn of a leaf shows the three words, *clean*, *island* and *climacteric*. The original sense of our word *clean* was pure, and we have kept that meaning far better than the Germans, who have applied the same root word in the sense of puny or small. As to *island*, we spell it wrongly from a false etymology through the mid-French word *isle*. The old English was *igland*, meaning a wet or water-land, and in middle English was written *eland* or *iland*; a spelling more correct in respect of the original root-word. From the simile of the round or step of a ladder we get our term *climacteric*, the derivation being from the Greek *klimax*, which meant a ladder.

An allusion to *cataract* of the eye reminds one that the term comes from a Greek word meaning a waterfall or down-rushing. The relation between the original idea and its derivant is not very clear until we realize that in both Greek and mediæval Latin the word *cataract* had also the meaning of a portcullis or grating to a window. As far back as 1550 Ambrose Paré wrote of "cataracte ou coulisse," and Cotgrave in his dictionary of 1611 describes *coulisse* as being "a portcullis and also a web in the eye." The old notion was that, even when the eye is open, the cataract obstructs vision as the portcullis blocks a gateway. The term portcullis is from the old French term *porte coulisse*, meaning a sliding door, but from the resemblance of the lower pointed teeth of a portcullis to a harrow, a later French word *herse* came to mean both a harrow and a portcullis. From this French word *herse* we get our word *hearse*, conventionally used now in reference to the vehicle on which a coffin is carried. The earlier meaning of *hearse* was a framework to support candles placed round a coffin or dead body, and clearly this framework was so named from some resemblance to a harrow or rake. A curious and obsolete medical word for "a web or cataract in the eye" is *tay* or *tey*. Thus, Lowe in his "Chirurgirie," written in 1597, says, "Some cataract or taye which covereth the prunall called the window of the eye." The same

word stood also for the outer membrane of the brain, as in old French we find *teie dure* or *dura mater*, which suggests a derivation from the Latin *theca*, a sheath or covering.

On the same page, occurs the word *denizen*. This has an interesting history, and its origin goes back to the records of mediæval London, in which a distinction was made between people who lived *deinz* (*dans*) *la cité* and those who lived *fors* (*hors*) *la cité*. The former or dwellers inside the city were called *deinzeins* from which we get our *denizens*, and the others or those who dwelt outside the city were called *forsein*, now written *foreign*. Analogous with *denizen* is the word *citizen*, from the older word *citein*. The following translation of a mediæval London by-law, given in the *Liber Albus* of 1453, shows in a characteristic way the distinction then existent between *denizen* and foreign traders. "Also that no *deynzeyn* poulterer shall stand at the *Carfax* of *Leadenhalle* in a house or without, with rabbits, foules or other poultry to sell, and that the *forsein* poulterers, with their poultry shall stand by themselves and sell their poultry at the corner of *Leadenhalle*, without any *deynzeyn* poulterers coming or meddling in sale or purchase with them or among them." It is interesting to note the use of the word *Carfax* in the foregoing, as the word survives to this day only at Oxford where it is a well-known land-mark of that city. The word was the old and usual name for a four-cross way, and evidently corrupted from the old French *carrefour* which again came from the vulgar Latin *quadri-furcum* or four-fork.

An article on metaphysics presents the two words *idea* and *dream*. Both deserve a passing note, especially as their modern use is different from the original sense. Thus, *dream* in old Saxon meant mirth, noise and minstrelsy, and it is remarkable that in old English there is no trace of the word being used in our sense of fanciful images or a vision during sleep, which interpretation seems only to have been developed in the thirteenth century. As for the word *idea*, there is probably no word in our language which has been more ill-treated, or one concerning which the distance is so immense between what it means properly and the slovenly uses which colloquially it is made to serve. Contrast the current remark "had no idea that you would leave so soon" with Plato's use of the word as a supposed eternally existing pattern or archetype of things, representing eternal notions of God and perfect in themselves; or with Milton's use of the word when he speaks of the Creator contemplating his newly made world and says, "how it showed, answering His great idea." The modern use of the word, in

the sense of opinion or notion, dates from the seventeenth century.

Most of us have heard of the *mandrake*, and the occurrence of the word in an article on travel impels one to say that it recalls some quaint old-time beliefs. The old name was *mandragora* and "its forked root is thought to resemble the human form, and was fabled to utter a deadly shriek when plucked up from the ground." The poet wrote about it, "horrid grotts and mossie graves where the mandrake's hideous howles welcome bodies devoid of soules." Even its fruit was thought, when eaten by women, to promote conception, and since the time of Shakespeare it has become synonymous with narcotic. "Not poppy nor mandragora," says Iago, in the hearing of the tortured Othello, "nor all the drowsy syrups of the world, shall ever medicine thee to that sweet sleep which thou owedst yesterday." Another virtue was attributed to the mandrake or *mandragora*, especially if the plant were obtained from the foot of the gallows. The idea was that it represented a hand from the gallows capable of pointing out hidden treasure, and finds expression in Ingoldsby's "Hand of Glory" where occur the lines, "Now mount who list, And close by the wrist, Sever me quickly the dead man's fist." A casual reference to the plague and use of the word *pestilence* raises a series of interesting references. The word *pest* meant originally any deadly epidemic disease, but in the sixteenth and seventeenth centuries was confined especially to the bubonic plague. In an old history of the Scots, occurs the following, "within the Castell was the pest and diverse thairin dyed." The modern meaning of *pester* seems due to a mistaken association with *pest*. Its earlier meaning was to entangle or hamper, as when Milton writes in his "Comus," "confined and pestered in this pinfold here." In old French, there was a verb *empestrer* meaning to entangle, and from that or in association with the entangling use of *pester* came the word *pastern*, or *pestern*, meaning a shackle. When we speak of the pastern of a horse, we refer really to the place for hobbling or shackling the animal, and undoubtedly recall an old French verb *pastoiare* or to *pastern*, meaning to fetter or clog, and one sees a connection here with pasture through the old French word *pasturon*, which was a shackle used to prevent grazing horses from straying.

Taking up a fresh number of the Journal, the page opens where there is a nominal roll, and a glance at a few of the names suggests a series of notes. The names of Gunter, Arkle, Aldridge, Tyrrell, Hackett, and Gorman catch the eye; these are examples of

corrupted survivals of Anglo-Saxon compounds, in which the suffix has been simplified. Thus, *Gunter* is from *Gundhere*, in which the suffix *here*, meaning an army, was compounded with the Scandinavian name *Gun*, or *Gund*. So, *Arkle* is but *Earncytel*, in which the suffix *cytel* means a cauldron or kettle, and traceable also in such names as *Chettle* and *Kelsey*. The name *Aldridge* is probably a perversion of the old name *Ealdric*, in which the suffix *ric* meant powerful, and similarly through the old Saxon *Thurweald*, in which the suffix *weald* meant ruling, we get *Thorold*, *Turrell*, and *Tyrrell*. The name *Hackett* is but a diminutive of *Hack*, from the old Saxon name *Haco*; and *German* represents the old name *Gormund*, in which the suffix *mund* meant protection. Next one sees such names as *Rawnsley*, *Barker*, *Skrimshire*, *Corker*, *Muir*, *Pilcher*, *Creagh*, *Blenkinsop*, *Cotterill*, *Walker*, *Kelly*, *Tyacke*, *Bradshaw*, and *Mainprise*. This last name means taken by the hand, used both for a surety and a man out on bail; an old definition of a surety runs, "maynprysyd or memprysyd, manucaptus, and fideijussus." *Rawnsley* is an excellent example of an Anglo-Saxon place name, in which the *ley*, meaning a meadow, is qualified by *rawn*, or raven, and the whole meaning the meadow where the ravens collect. The fairly common name of *Barker* is a corruption of the Anglo-French term *berquier*, a shepherd, now written *berger*, in French. The name seems to have been applied also to the man who barked trees for the tanner; thus, the old lines on "Edward IV and the Tanner of Tamworth" run, "What craftsman are you? said our King, I pray you tell me now." "I am a barker," quoth the tanner; "what craftsman, please, art thou?" A similarly occupative name is *Muir*, and its associative *Muirhead*, both originating from the mediæval office of *le muur*, or the man who had charge of the mews in which the hawks were kept while moulting; hence our current phrase, "mewed up," and Chaucer's use of the word as meaning a coop, when he says, "Ful many a fatte partrich hadde he in muw." When the royal mews or hawk-houses near Charing Cross were rebuilt in 1534 as stables, the word mews acquired its present meaning. An alternative but less probable origin of *Muir* is from moor, meaning a morass or moorland.

The art of self-defence has given us the name of *Skrimshire* from *Scrimgeoure*, which means scrimmage or skirmish, and is connected with the German *schirmen*, to protect or fence. The old line "Qe nul teigne escole de eskermerye ne de bokeler deins la citie," suggests the application of the name to a professional

sword-player. *Corker* seems to stand for caulker or calxer, that is, one who stopped originally the chinks of ships and casks with lime. The men who made fur cloaks or pilches were clearly the first bearers of the name of *Pilcher*; the word *pilche* came from the vulgar Latin *pellicia*, which was a corruption of *pellis*, a skin; and Chaucer says, "After greet heat cometh colde; let no man caste his pilche away," which is but an early version of "Till May is out, ne'er cast a clout." As representative of old Celtic words connected with natural scenery we have the name *Creagh*, or a rocky glen, to which are probably related *Craig* and *Carrick*. An old northern name for a glen was *hope*, from whence we get names like *Heslop*, *Blenkinsop*, *Trollope*, *Hartopp*, *Allsopp*, and *Burnup*. In many of them the first element is probably but the name or state of the first settler, and in *Blenkinsop* one conjures up some early Blenkin who settled in a glen, but who and what the original Blenkin was, it is difficult to say, but the obsolete *blench* and *blenk* both meant to cheat or deceive, and, possibly, Blenkin was someone of a corresponding reputation; *Heslop* means the glen full of hazels. In *Cotterill* we see the diminutive of *cotter*, and recalling the commonest of names for a humble dwelling. To the wool trade we must trace the name of *Walker*, who, with the *Fuller* and the *Tucker*, did all very much the same work of trampling down the cloth. These three names are variously met with: *Walker* common in the north, *Fuller*, from *fouler*, to trample, in the south; and *Tucker*, from *touquer* to beat, in the west. In Wyclif's Bible all three last words are used in variant rendering of St. Mark, ix, 3. As explanatory of *Kelly* and *Tyacke*, one recalls the fact that the former is from the Gaelic word *kaeli*, meaning a cultivator, and the latter from an old Cornish word, meaning a farmer; while to explain *Bradshaw* we need to remember that the word *shaw* was once a common term for a wood. It was current in the northern counties much as *holt* was to be found in the south, and *hirst* or *hurst* in the west; all meant a wooded hill, and from them many compound names survive.

The constant occurrence on every page of *its* invites the note that this genitive of *it* has a curious history, and only gained access to our language because of the need to remove an inconvenience. To Bacon and Spenser, the word *its* was unknown, and even Shakespeare, Ben Jonson and Milton use it very rarely. One cannot find it once in the early versions of the Bible, where its place is fulfilled by either *his* or *her* applied freely to both persons and things, or else by the use of the word *thereof*. Thus, Fuller

says of Solomon's Temple, "twice was it pillaged by foreign foes, and four times by her own friends before the final destruction thereof," and Bacon wrote, "Learning hath his infancy when it is but beginning and almost childish; then his youth when it is luxuriant and juvenile; then his strength of years when it is solid and reduced; and lastly his old age when it waxeth dry and exhaust." So also in an early Bible we read of the Ancient of Days that "his throne was like the fiery flame and his wheels as burning fire." To the modern, there is some difficulty in this sentence not to refer both the first and second "his" to the Ancient of Days, yet we know that both belong to the "throne." So soon as ever it was forgotten that *his* was the old genitive of "it" as well as of "he," a manifest inconvenience attended the employment of *his* both for persons and things. This was overcome by the genitival employment of "it," as exemplified in the first Authorized Version of the Bible, and in the following from Shakespeare who, in "the Winter's Tale" says "the innocent milk in it most innocent mouth," also in "King John" he says, "Go to it grandame." This use of "it" was a stepping-stone for the introduction of *its* as we now employ it, but its use was far from general until well into the eighteenth century; on the contrary, most of the writers of the early seventeenth century seem to have done their utmost to avoid its use.

A reference to the examination of a fistulous opening with a probe, in a clinical report, prompts the note that our word *fistula* is but the Latin for a flute or pipe; spelt as *fistle* or *fystel* in old English it was cognate with *fester*, a sore. Bulwer, writing in 1644, makes the following quaint use of the term, "The mouth is but a running sore and hollow fistle of the minde." How many who use a *probe* ever remember that the word is but an adaptation of the mediæval Latin *proba*, a proof or examination, constantly occurring in accounts of judicial proceedings of that period. As the name for a surgical instrument, its use goes back to 1580, when Hollybrand published a book on surgery and says, "une petite esprovette or probe, a small instrument wherewith surgeons do search wounds"; while another work of the same time speaks of the "provet or soundinge irone to sounde the depthe of the fistle." The same instrument was known also a *seeker*, for Wurtz in his "Chirurgirie" of 1658 speaks of it as "the small iron instrument which by reason of seeking is called a seeker," so again, the same idea is found in another sentence, "Lechis sone his wonde is sought." Though the word *seek* is thus used in the sense of *probe*, it is interesting to note that the verb *seek* also meant to attack, and

in both early and middle English there are constant references to sickness seeking out the people. Another clinical report mentions a man who was giddy and suffered from violent eructations of gas and foul breath. Our word *giddy* is an old one, and comes apparently from the old Teutonic name for God. In early English, the term meant insane, having the primary sense of to be possessed by an elf or god. As implying a vertigo, its use dates from the fifteenth century. Many people think our word *gas* is related to *geist*, a spirit, but as a matter of fact it was invented by Van Helmont in 1598 for an occult or ultra-rarefied principle, or in his own words "for want of a name I have called that vapour gas, being not far severed from the chaos of the Antients." In a like way, our word *breath* comes from an old Teuton stem meaning to burn, and, in early English, breath meant any hot vapour or steam, and it was not until the fourteenth century that we find it used as meaning air taken into or expelled from the lungs. A reference in another case to the *sphincter* muscle, reminds one of the common origin of this and allied words from the Greek *sphuxein*, to throb, and also of the curious remark in a book of 1737, in which avarice is described as "the sphincter of the heart"; certainly an odd but pertinent use of the word.

Three more or less military terms next attract attention. *Furlough* must come from either the Dutch *verlof* or the archaic German *verlaub*, both meaning absence or leave. *Havresack* is really the oat-sack, coming from the German through the French. It suggests the cognate word *knapsack*, which is from the Dutch word meaning food, and it is curious to find that Shakespeare in the "Merchant of Venice" says "I would she were as lying a gossip in that as ever knapped ginger"; a use of the term as clearly meaning biting or chewing. The term *kit* as implying a man's equipment, reminds one that the word meant in old days a tub or basket and, by extension, became applied to a valise and its contents. As to the common title of *colonel*, it is worth noting that in the original letters of Ellis, written in 1548, occurs the sentence, "Certain of the worthiest Almaynes at the desire of their coronell re-entered the towne." The word *Almaynes* refers to what we should now call Germans, and the *coronell* represents the earlier writing of what we now call *colonel*, or the person who led the little column. The origin of the word is probably Italian, but until the end of the sixteenth century was always spelt with an *r*, where we use an *l*. This was due partly to dissimilation of the latter letter in the Romance languages, and to a false etymology associating the word

with *corona*. The spelling of *coronel* died hard, for we find it as late as 1816. Our modern pronunciation, by two syllables only, dates back to 1669 and in 1701 became shortened familiarly to *coll*, an abbreviation we are thankful to find has lapsed from use. Again the expressions "to provide *quarters*" and that of "give no *quarter*" remind one that, in both cases, the word "quarter" comes from the middle Latin word *quartarius*, meaning sanctuary or shelter. Further, the term *aiguillette* as used for a staff ornament suggests the note that the present-day gilded cords and attached gold tassels are but the representatives of the heel-ropes and wooden pegs which, in old-days, every squire carried over his shoulder for use in tethering or picketting his horse and that of his knight or master.

In a note upon certain therapeutic formulæ one sees the word *treacle*, which reminds one of the curious connection between that familiar syrup and therapeutics. Its old name was *theriac*, having derivation from the Greek word *theer* or wild animal, and meant originally the antidote against venomous bites, being a confection of viper's flesh as the most potent remedy for the bite of a viper. Later, it embraced a concoction of spices and herbs of great repute as applications to wounds. Thus Venice treacle or viper wine was a common name for a supposed antidote against all poisons; also garlic was called churl's or poor man's treacle and water germander was known as the Englishman's treacle; similarly an itinerant quack doctor had the doubtful name of treacle-carrier. Chaucer uses the word in reference to the religious conception of Christ as the antithesis of evil, when he says, "Crist, which that is to every harm triacle." Thus, indirectly, through *treacle* we get the clue to the primitive meaning of *therapeutics* as a means of action against animal venoms. Near by to this reference one sees the word *liquorice*, than which few words have suffered more distortions. The original is the Græco-Latin *glycyrrhiza* or sweet root which, corrupted into the late Latin term *liquiritia*, passed gradually into the German *lakritze*, the Italian *regolizia* and the French *réglisse*. The middle English form *licoris* suggests the influence of the plant *orris* which has a sweet root, while the modern spelling is not free from the suspicion of association with liquor. A turn of the page presents one with an allusion to the application of *leeches*, a word not unfamiliar as applied to doctors as when Denys, of Burgundy, said to the physician, "Go to; He was no fool who first called you leeches." Reade, when he wrote that line in the "Cloister and the Hearth," possibly was unaware that both the blood-sucking annelid

and the doctor represent the old Anglo-Saxon word *laece*, meaning a healer. A little farther on occur the words *rhubarb* and *senna*. The former ought really to be written *rhabarb*, meaning as it does the foreign *rha* or *rha-barbarum*, "a comfortable and wholsom root so named from the Pontic river Rha, near which it groweth." As far back as 1533, Lyly, in his book called "Euphues," says, "the roote Rhubarbe, which being full of choler, purgeth choler." The old and familiar name of *senna* comes to us through the Latin from the Arabic *sana*, a shrub of the genus *cassia*. The *senna* of the pharmacist is familiar to us as a cathartic and emetic, and the detestation with which it is regarded in the youthful mind is reflected in the words of Godwin from his "Caleb Williams," written in 1794, wherein he says, "I shall hate you as bad as *senna* and *valerian*." Even Lord Chesterfield, in one of his sagacious and worldly wise letters to his son, advised "chewing a little *rhubarb*, when you go to bed at night, or some *senna* tea in the morning."

The same therapeutic article suggests the note that our familiar drug *calomel* appears to owe its name to the fact that an early alchemist, who discovered it, saw a beautiful black powder change into a white powder in the course of manipulations. The term probably owes its origin to the Greek words *kalos*, fair, and *melas*, black, and from the circumstance that white or shiny bodies rubbed therewith become black. Nothing seems to be known as to when, where, or by whom the name was coined. The drug *hyoscyamus*, or henbane, was spoken of in 1265 as *lusquiamus* or the *hennebonne*, while *hemlock* appears in the Epinal glossary of 701 as *hymlice*. The obstetric asset, known as *ergot*, obtained its name from the fancied resemblance of the hardened mycelium or sclerotium to the spur of a cock, known in old French as an *argot*. Boracic acid reminds one that *borax* comes from an Arabic word meaning to glisten, and was introduced into the Romance languages in the ninth century as expressing most of the crude salts of sodium, all of which were of a glistening nature. Of the origin of the name *castor oil* it is difficult to be sure, but the present day yellow oil extracted from the *Ricinus communis* or *Palma Christi* probably owes its name to the circumstance that the drug took the place of the old medicine *castoreum*, obtained from a gland of the castor or beaver, and of which Trevisa, writing in 1405, says, "castorium helpyth ayenst many sykenesses." Our terms *soda* and *potash* have involved histories, but the former comes from *solida*, meaning firm or hard, as the original samples were unusually dense, while the latter gets its name from being obtained in early times

from plant ashes collected in pots or crucibles. The word *iodine* we owe to Humphrey Davy who coined it from Gay Lussac's word *iode* for the violet-coloured gas belonging to the halogen group, deriving it from the Greek *ion*, or violet. The same root gives us *ions*, or the constituents into which electrolytes are decomposed. The febrifuge *quinine* is so called from the Peruvian word *quina*, meaning bark of a tree, while the correlative word *cinchona* should be written *chinchona*, as it was named in 1742 by Linnæus in honour of the Countess of Chinchon, a Spanish vice-queen of Peru, who brought a supply of the bark to Europe in 1640. The meadow saffron or our drug *colchicum* gets its name from a reference to the poisonous acts of the legendary Medea of Cholchis, a region to the east of the Black Sea, and in reference to whom "venena colchica" was a common phrase of Roman writers. To the thimble-like shape of the flowers of the fox-glove we owe our term *digitalis*, which was so named by Fuchs in 1542. The ulterior etymology of *iron* is uncertain, but in middle English it was written both as *isarn* and *iren*, and in old Irish as *iarn*. The balance of evidence points to a series of phonetic changes from the old Frisian *jarn* down to our present-day spelling. The origin of *mercury* as a name for quicksilver is associated with *merces*, meaning wages or coin, and to the fact that Mercury was the god of merchandise; the metal was regarded originally as an artificial silver suitable for trading tokens. A similar involved history attaches to *ammonia*, which, originally as a salt, was obtained from the dung of camels near the Temple of Jupiter Ammon in Libya. At one time the name was corrupted into *armonia* from a false etymology from the Greek word meaning a joining or fastening, owing to the use of sal ammoniac in soldering processes. The familiar *laudanum* comes from the Persian word *lardarn* and the Greek word *leedanon*, which were names for the poppy plant, while *opium* comes from the Greek *opos*, meaning the sap thereof. Also to a Greek name for a simple bread poultice, or *kollura*, we owe our word *collyrium* for an eye-wash, and as meaning a topical remedy for disorders of the eye the term goes back to 1397.

Running the eye over fresh pages, one catches sight of such words as *creature*, *forest*, *service*, *aspect*, *sentence* and *instinct*. These all impel the remark that they are typical examples of the curious process in our language of throwing back the accent of a word as far as possible, and of a characteristic feature in our speech. In Chaucer, Spenser and Milton, all these words, and many like them, had the accent on the last syllable. So too, theatre

was théâtre with Sylvester, and the current pronunciation of this word by many of the lower classes is really archaic rather than vulgar; in the same way academy was acadēmy for Butler and Cowley, and produce was produċe for Dryden, and both effort and essay were for both Dryden and Pope rhymed and spoken as effort and essāy. In my own time, I recall the discussion as to whether revenue should not be revēnue, as it used to be pronounced. In this connection of accent placing, it is interesting to note that Dryden ends an heroic line with apōstolic, yet we now always say apostōlic; this is a rare instance of the accent moving in the opposite direction.

The account of a method of operating upon a *nævus* reminds one that the old and obsolete word *nave* meant a spot, or blemish, and, in a book of 1697, occurs in the sentence "He was a tall, handsome and bold man, but his næve was that he was damnable proud." On the next page is the word *silly*, which few realize meant originally blessed or happy. Its use in this sense has quite dropped out of the language, but in Cumberland, Northumberland, and in Scotland there survives still the term *silly-how*, as meaning a child's caul. Here, the element *how* is *houve* which signifies a cap or hood, and the happy or blessed hood is cognate with the German name *Glückshaube* for the same obstetric curiosity. The rarity which marks the birth of a child with this bag of amnion or of amnion and chorion over its head is probably the reason why it is accounted fortunate or lucky to be so born. The prevalence of this idea is well known to exist in many parts of Britain, and the belief is common in the northern counties that the silly-how, if preserved, sympathizes with the person whose face it covered at birth, so much so that it is dry when he is well and moist when he is ill. In Scotland, and many other places, the possession of a caul or silly-how is regarded as a safeguard against drowning, and not long ago, advertisements were common in newspapers read by sailors for the sale of these membranes.

The occurrence of the words *individual* and *person*, both of which are expressive of a sense and knowledge of one's own existence as a thinking and feeling being, suggests the comment that the word *individual* means literally "inseparable," and came from the early scholastic Latin *individuum*, or that which was indivisible. Used in mediæval logic, *individual* was a member of a class or species, and also was a theological term in reference to the Trinity; it did not acquire its present-day meaning in English until the time of Shakespeare. The word *person* was, originally,

a dramatic term, coming through the Latin from the old verb *personare*, which meant to sound through, and the person or *persona* was applied to the mask which actors wore and spoke through. From this, it acquired the meaning of one who performs or acts any part, hence a personage became one who plays an important part on the stage of life. In modern times, the word *person* and its derivatives has acquired an extension of meaning, more particularly in the sense of psychological and metaphysical concepts. Next, the words *proud* and *mirth* catch the eye. The former comes from the old Norman word *prud*, which descends from the first element of the Latin verb *prodesse*, to be of value. In early French, the meaning of *prud* was brave or valiant, and possibly from the general bearing of the "proud" Normans to the Anglo-Saxons, a change of meaning became attached to the word until *proud* acquired the sense of haughty or arrogant. Our word *mirth* has a curious psychological origin for, with its related adjective *merry*, it is traceable to an old Saxon word meaning short, and really connotes that which shortens time or cheers, and gradually has become to mean enjoyment, pleasure or happiness. The history of *dangerous* is equally interesting, for it comes really from the Latin *dominus*, a master, and its earliest meaning in English was something difficult, arrogant and haughty. By Chaucer's time, it got to be used to express something dainty and fastidious, possibly again as aspects of the lordly and dominant class; and it was not till quite the fifteenth century that *dangerous* meant any thing risky or perilous. The word *genius* first appears in English early in the sixteenth century, and was used in the classical sense of a tutelary god; later, it acquired the meaning of the spirit or the distinctive character of a man or period. Its modern use for mysterious or extraordinary creative power seems to date from the eighteenth century, and was probably fostered by the employment of the word to translate the Arabic term *jinn*, or the supernatural being of the "Arabian Nights." Few would believe our familiar word *blood* to be the parent of the religious term to *bless*; yet it is so, because the original meaning of to *bless* was to mark or consecrate with blood. In early English, to *bless* meant to wound or injure, as when Cœur de Lion said in 1325, "Whenne I hym had astrokifet, and wolde have blyssyd hym bet." That *blessed* and *bloody* are etymologically synonyms is emphasized by the fact that, in modern French, *blessé* means to wound or cover with blood. The expletive of the streets is thought by some to be but a corruption of the old-time oath "by our Lady." It may be so.

Having just written the word *blood*, one is reminded that an alternative term *gore* meant, in old English, mud or filth, and that in the same language a closely related word *gar* meant a spear or any angular thing. It is difficult to trace the evolution of the former from the latter, but old writers hint clearly of the origin from a common root of both *gore* as expressive of blood or filth, and of *gore* as expressive of a piercing. Thus, Fitzherbert, a chronicler of 1523, says, "For els the beastes with theyr hornes wyll botter the horses and the shepe and goar them in theyr bellyes"; and Speed, writing in 1611, says: "The battels joyned and the fylde goared with bloud, the day was loste upon the Kinge his syde." In the sense of an angular piece or thing, our women folk still talk of *gores* as representing wedge-shaped pieces of cloth serving to produce a difference of width, as in making the waist or other parts of a skirt. Chaucer says, "A ceynt she werede a barmful clooth ful of many a goore."

Next one strikes an article dealing with food and rationing. Almost the first word to attract notice is *omelette*. Originally meaning a thin flat cake or custard, the name springs from *lamella*, which means a thin plate; from that sprung the old French *lamelle*, and from it came *alemelle*, and that word by change of suffix grew into *alemette*. By metathesis, this gave *amelette*, which still survives in certain dialects of France, though the modern French gives *omelette*. Close by, one sees the word *salt-cellar*, which is an excellent example of pleonasm, arising from ignorance of the true meaning of the word. The word *cellar* in salt-cellar is not the same as in wine-cellar. It really comes from the French word *salière*, meaning a seller of salt, hence the word salt is unnecessary. Then comes the familiar phrase "a loaf of bread, a piece of butter, and some meat." How many know that the old Teutonic name for *bread* survives in the modern *loaf*? The old English *hlaf*, from which comes our *loaf*, meant that mixture of flour and water called bread. The old English *brede* or *bryead* meant really a piece, and possibly was derived from *breotan*, which meant to break. Anyhow, all early versions of the Bible show the old *brede* to mean a fragment, as in the Gospels, and that *hlaf* or loaf was identified with *panis*. It was not till after 1200 that bread meant the actual substance, and it is evident that the word meaning a piece or fragment has passed through the senses of "piece of bread" or "broken bread" into that of bread as a substance; while at the same time the original *hlaf* or loaf has been restricted to the undivided article, as shaped and baked. In our northern dialects,

the word "piece" still survives as meaning a portion or gift of bread and illustrates the transition of the conception of a broken fragment being "bread." Where we got our word *butter* from is doubtful; the old forms suggest a Latin origin, through some Scythian dialect, but it may come from the Greek *bous*, an ox or cow, and *turos*, cheese. The word *meat* in old English signified food of all kinds, and is used in that sense in early translations of the Bible; it is only in comparatively modern times that it means flesh food only. As for *biscuit*, it is a senseless adoption of the modern French spelling without the French pronunciation. The regular form in English, from the fifteenth to the eighteenth century, was *bisket*, and before then was *bysqwytte*.

A new page shows the word *peruse*. Originally, it meant to wear out, from the old French *par-user*; in the sixteenth century, it meant to sift or sort, and hence to scrutinize a document. The transition from wearing out to sifting is difficult to follow; possibly the explanation is that the word originated as a mis-spelling of *perviser*, to look through or survey, and became printed in the earlier books as *peruise*. The influence of spelling upon sound has been great, and a good example is the current custom of sounding a "z" in words like Mackenzie or Dalziel, the fact being that this "z" is nothing but a modern printer's substitute for an old symbol which had the sound of "y," so that we ought really to say and write the names as Mackenyie and Dalyell. Next occurs the word tobacco; how many devotees of the noxious weed have any idea that *nicotine* is so called in memory of him who gave "the first intelligence thereof unto this Realme," namely, Jacques Nicot, the French ambassador at Lisbon, by whom tobacco was introduced into France in 1560? A curious word crops up on another page; it is the old Anglo-Indian expression *mordichin* for the cholera. Among the Marathas, an old name for the disease was *modachi*. Can we assume that the old Anglo-Indian phrase came from the Marathi, or was it but a perversion of *mort de chien*, and that it expresses a grim humour on the part of early Anglo-Indians to describe the dreaded scourge of the East as a dog's death? Possibly not, but it is interesting to note that an obsolete Scottish word for the glanders was *mortechien*, and more or less identical with *mort d'eschine* meaning death of the spine, and an old French name for the glanders. The sixteenth century term in England for the same disease was "mourning of the chine," from the notion that the morbid discharge from the nostrils came from the spine, and possibly from a corruption of the French term. So by these strange

metamorphoses *mort de chien*, or a dog's death, came to mean cholera in India, and in Scotland, once meant glanders.

The turn of a leaf brings one to an article on travel, containing several words of interest. The familiar word *travel*, as indicating the making of a journey, was spelt originally as *travail*, and meant to toil or be in distress, a meaning which the hardships of the early roads justified. The older spelling is confined to express work, or used in the obstetric sense. This latter goes back to 1472, but the figurative employment of the word is peculiarly common in seventeenth century books, mostly with a theological bearing, as in Milton, who says, "Let her cast her abortive spawne without the danger of this travailling and throbbing kingdome." In some seventeenth century Portuguese accounts of India we find a whip or scourge written variously as *chabuco* or *sjambok*; it is clearly a corruption of the Persian word *chabuk*, meaning a whip. The Zulu term *kraal* is but a contracted Dutch form of the Portuguese *curral*, which means a sheep-fold. Another African word, which has travelled far, is *assegai*. It is a Berber word which passed through Spanish and Portuguese into French and English. In the old French of the fourteenth century we find *archegaie* as meaning a spear, and Rabelais used the form *azagaie* to express a slender, long-headed pike. In early or middle English *l'archegaie* was corrupted by agglutination into *lancegay*, or *launcegay*, as shown in the following lines from Chaucer: "He wroth upon his stede gray, and in his hond a launcegay, a long swerde by his syde." The early disappearance of the word from English is probably due to the fact that the use of this weapon was prohibited by Statute in 1406. How many readers realize that the father of all weapons known as *revolvers*, was the "snaphaunce petronell"? Invented and used in England in the time of Charles I, it was really a gun having a six-chambered cylinder, which revolved by the raising of the hammer. The inception of the fearsome weapon dates from 1550, when an arquebus was invented having a cylinder rotated by hand. In all these early types, even down to 1807, the separate chambers were each fitted with the neatest of priming caps; but actually it took as long to fire each chamber as to fire a single-chambered pistol. The invention of the percussion cap by a Scotch parson in 1807 changed all that, and the weapon designed by the Englishman, James Thompson, in 1814, was a great advance in the direction of single-barrelled poly-chambered guns. The earliest extant revolver pistol is a fine brass weapon in the United Service Museum, numbered 2363. The whole arm is two feet long, and has the big

straight handle of all old pistols. Some authorities attribute the invention of the modern revolver to Grobet, a Swiss, but in reality our modern weapon originated from Samuel Colt, an American, born in 1814, who patented his first practical revolver in 1835. He was an inventive genius, and the shape of Colt's handle—the most satisfactory ever affixed to a pistol—has kept its character for eighty years. Other features of Colt's work were the double action, "sweetness of pull," and the locking system, which enabled his weapons to take smokeless powder at once; while all other revolvers burst their breeches. The vogue of the "Colt" was extraordinary all over the world, and Bret Harte is its poet, in his well-known verses, "What the Bullets Say." Our present makes are but improvements upon Colt's original weapon.

Seeing the word *abeyance* suggests the remark that when one says that such and such a matter is in *abeyance*, we really mean that we regard it with open-mouthed expectancy. It comes probably from an old French word *abaier*, meaning to gape at. The expression "to be at bay" has a related origin, and may be an old hunting metaphor from the French *aux abois*, and, as meaning facing the baying hounds, it may come also from *abaier*, to gape at. Close by is the word *sore*, which is not without interest. As a noun it has four meanings, three of which are practically obsolete; namely, bodily pain, disease, and mental suffering. As an instance of the first, there is the following quaint sentence from the mediæval book, "Cursor Mundi," written in 1347, which says, "Ute of hys syde witoten sare a ribbe he tok." The same book affords an example of the second meaning, when it says, "Sainte Anthonies sare, called the Rose"; and Chaucer furnishes an illustration of the third usage in his question, "Who feeleth double soor and henynesse, but Palemon?" In the sense of being a bodily injury or wound, *sore* is more familiar to us, and more particularly means a place or part where the skin or flesh is painfully tender or raw; thus, we say, "Apply a salve to that sore," or talk of bed-sores. Used as an adjective, the word *sore* had meanings which are largely obsolete; though it is still possible to hear of a sore-head in Scotland, signifying a headache; and even in England it is common to hear of a sore-throat or a sore-spot. These phrases are true survivals of the word in the sense of pain, but do not imply necessarily any ulceration of the mucous membrane or skin. Closely associated with *sore* is the word *sorrow*. This has an obsolete meaning of physical pain. Most of us are familiar with the Authorized Version of the Bible and the reference,

in Gen. xxxiv. 25, to the state of a circumcision wound, and how when the men of Shalem were sore, the sons of Jacob fell upon them and slew them. Now, in Wyclif's Bible, the verse runs, "The thridde day, when the sorrowe of the woundes is most grevows." The Hebrew word here translated as sorrow, or sore, is *kaab*, meaning to be pained. *Sorrow* is cognate with the German *sorge*, meaning anxiety, but *sore* is cognate with the German *sehr*, or very, as when we say, sore afraid. Writing of sores reminds one that a few days ago, when reading "Far from the Madding Crowd," the following curious sentence impressed itself, "I've been visiting to Bath because I had a felon on my thumb." In both Canada and the United States the word *felon* is in common use as meaning a whitlow. Possibly it is old French, and metaphorically a fell-villain. We all know the Latin *furunculus* for a boil or whitlow, but how many realize that the word means really, "a little thief"? Another Latin name for the same was *tagax*, which literally is thief again; so that the dialectic word *felon* for a whitlow is not so very surprising. In some parts of the north of England a boil or whitlow is still called a *tag*, which suggests a survival of the Latin *tagax*; in other districts the common term is *tagnail*, *nag-nail*, or *agnail*, which are equally suggestive, and, moreover, remind one that to *nag* means to ache persistently; while *nail* is used in Johnson's translation of Ambrose Paré's works as meaning a carbuncle, because "it inferreth like pain as a nail driven into the flesh." Oddly enough the nail-wort is the name given to *Saxifraga tridactylites* in reference to its supposed efficiency in affections of the finger nails; it is called also whitlow grass for the same reason. Mention of the plant *Saxifraga* tempts one to say that it has some interest of its own. The Latin name of the "rock-breaker" was probably given because many species of the plant are found growing among stones and in the clefts of rocks. Pliny derived the name from the supposed lithotriptic virtue of the plant, and said, "Calculos e corpore mire pellit frangitque," but the difficulty is that *saxum* is far from being synonymous with *calculus*.

The eye rests suddenly on the word *chemistry*, sometimes spelt *chymistry*. The variation in spelling has an etymological meaning. When we write *chemistry*, we endorse the view that the earliest conception of the art, now a science, was the amalgamation of metals, first practised with success in Egypt, of which country the old or Greek name was *Cheemia*; but, to be exact we should pronounce it with the "e" long. If we write *chymistry*, we affirm

the word to be derived from *chumos*, meaning sap or juice, and that the chymic art first occupied itself with distilling juices of plants. The weight of learned opinion is in support of the spelling with a "y." Next one sees the word *pleurisy*, derived from *pleura*, a pain in the side; formerly, it was written as *plurisy*, and is so spelt by Shakespeare in the lines, "For goodness growing to a plurisy, Dies of his own too much." Used in this conjunction with "too much" implies the assumption that the word came from *plus pluris*, a view little acceptable in these days, but prevalent many years ago. The question of spelling, and all it means to the intelligent reader, presents itself in such other words as *frontispiece*, *nostril*, *ell* and *abominable*; all these are noted on adjacent pages of the Journal. Milton spelt *frontispiece* correctly as *frontispice*, recognizing that it was the low Latin word "frontispicium" or forefront. How the notion of "piece" came in is difficult to understand. So again, *nostril* is written by Spenser as *nosethrill* or *nosethirle*. Now, to thrill, in old English, is the same as to drill or pierce, and it is obvious that the word signifies the orifice with which the nose is thrilled, drilled or pierced. Again, the familiar word *ell* of our childhood's table book is nothing but a cognate of the old high German *elina*, meaning a cubit, and associated clearly in length with the bone *ulna* from the Latin, and *olenec* or the forearm, from the Greek. The word *abominable* was commonly written in the sixteenth and seventeenth centuries as *abhominable*, suggesting clearly that it meant that which departed from the human, or *ab homine*, into the bestial. By a curious change in meaning and false etymology, an "h" has crept into the word *posthumous*, which should not be there. The word represents really the Latin *postumus* which was the superlative of *posterus*, or latest born. By a twisted association with humus or earth, it has come to be used of a child born, or a work published, after the death or burial of a person. To this warped meaning, the introduction of the "h" into the word is due.

All who have served in India are familiar with the native servant's term *ticket* for a visiting card, and it may interest some to know that the word was so used in England in 1782, being derived from *etiquet*, as the visiting card at that time was a novel detail in social amenities. In old French the word "ticket" meant a soldier's billet. The omission or intrusion of a letter often conceals and clouds the etymology of a word. Thus, *whole* in Wyclif's Bible was spelt *hole* and the addition of the "w" hides its relation to the verb to heal. To heal a man is to make him *hole*

or hale, and what we now write wholesome was *holsome* in middle English. So again, in the early editions of "Paradise Lost" and in the writings of that period we find *scent*, an odour, always spelt *sent*, and correctly so because it defines its relation to *sentio* or a feeling, and with such other words as *dissent*, *consent* and *resent*. The following passage from Fuller's "The Profane State" shows how close was once this relationship, not merely in respect of etymology, but also of significance: "Perchance as vultures are said to smell the earthiness of a dying corpse, so this bird of prey (evil spirit) resented a worse than earthly savor in the soul of Saul, as evidence of his death at hand."

Of those who live in *cantonments*, very few remember that the word means no more than a corner, angle or nook, from the old French *canton*. Its earlier use was in respect of angles of walls, but as applied to land areas the term dates from 1601. Our familiar word *book* comes from the old English *boc*, meaning a beech tree, and signifies how the earlier writing pads were of beech bark or of other wood; likewise, to *write* is but the modified survival of an old Teutonic word meaning to cut or tear letters in wood or bark, and has a cognate in the modern German *reissen*. Even the *ink* with which these words are written recalls a Roman Emperor, for the word is but a corrupted contraction for the *encaustum* or purple fluid used for the imperial signature, and carries back to the Greek *enkaiein*, to burn in. Using the word *signature* just now reminds one that in old days it meant a birth-mark or *nævus*; thus, in a book of 1682 occurs, "The fancy of the mother can form the stubborn matter of the foetus in the womb, as we see it frequently both in the instances that occur of signatures and monstrous singularities." Other words quickly present themselves which furnish glimpses into the thoughts of far-off ancestors. Thus, *learned* and *learn* go back to an early root which meant to follow a track, and *weary* to an old Frisian verb meaning to tramp over wet ground. The dangers of travel crop up also in our word *fear*, derived from the same Aryan root as *fare*, which meant a journey and sometimes a road or path. Originally, *fear* signified sudden danger or an ambush; the emotional sense of pain or uneasiness, as now current, dates from the fourteenth century. Another word which takes us back to primitive times is *earn*, which comes from the old English, meaning field labour and cognate with the German *ernte*, or harvest. So also, *gain* comes through old French from a Norse word meaning harvest or any benefit. A proverb of 1546 says, "Lyte gaynes make hoevie pruses," and one of 1620 says, "Men say righte well that gaine easeth paine."

Our word *free* is old Celtic, meaning dear; to the Celts, their word *fri* or *fre* was a distinctive epithet for those members of the household who were connected by ties of kindred with the head, as opposed to the slaves. From the same root comes *friend*, which we use as meaning those joined in mutual intimacy or benevolence, but originally the word friend implied essentially a beloved one.

We constantly talk of interesting clinical cases; that they are *cases* is because they are incidents occurring by chance, from the Latin stem *cas* of the verb *cadere*, to fall. That they are *clinical* is because they are usually in bed or lying down, from *klinein* to recline; and that they are *interesting* means merely that they are of such a nature that we have a share or concern in them, evidently from the Latin *interesse*, to be between, or of importance. The antithetic phrase, to be *bored*, suggests itself here. Used in the sense of ennui or annoyance, the term does not date earlier than 1766, in a letter of which time occurs the sentence, "He sits every night next to Lord Temple and has a complete bore of it for two hours." The etymology of the term is obscure, but some trace it to the old English word *bora*, meaning a drill or gimlet; the intermediate links between a drilling operation and a sense of annoyance are unknown; we can but surmise that the constant pressure of some forgotten talker suggested the effect of his anecdotes to be equivalent to being bored with an augur. Personally, one is inclined to trace the word back to the East Anglian name of *bor*, or *buur*, for a neighbour, and that when such a person became too neighbourly, unduly pressing, or obnoxious, arose the expression to be bored, as we now use it.

In the clinical reports, one reads that a patient had painful joints, that his case baffled all treatment, and that kindly help was given by So-and-so. To us the word *painful* has a precise meaning, but in old days it was used constantly as expressing trouble taken, or as we even say now "to take pains," and as they used to speak of a man as "the painful writer of two hundred books." While we employ the term *baffle* as meaning resistance or defeat, it meant in old days the punishment of tying a man by the heels to a tree-top. Much of my youth was spent in the eastern counties, and one remembers well the current rustic phrase of speaking of ripe corn, when beaten down by rain or wind, as being baffled or waterslain. It is difficult to trace how the word acquired its modern meaning. Similarly, when we say that some one did a *kindly* act and recall how Sir Thomas More, in his "Life of Richard III," tells that Richard calculated by murdering his nephews to make himself

accounted a kindly king, we fail to see much kindness in the act. We have, however, to remember that in middle English the word *kindly* meant *natural*, and that the true sense of More's passage is that Richard reckoned to be thought king by kind or natural descent. A contiguous reference to *buboes* and their treatment, suggests that the term comes from the Greek *bouboun*, or the groin; while to the Latin word for an acorn we owe our word *gland*, and that *groin* itself comes from the old English term *grynde*, meaning a valley or depression. The application of the word to the hollow between the abdomen and thigh goes back to 1400, when it was used by Lanfranc. Of course the associated word *inguinal* is purely Latin in origin, from the Roman name for the groin. As regards the terms expressive of the etiology of these enlarged glands, we know that *gonos* means a seed, and *roia* means a flow, and that in early times the discharge was supposed to be seminal in nature and variously called gomoria, gonorhey and the gonor. Thus, in Boorde's "Breviary of Health," written in 1547, we find "the gomeria passion is so named because Gomer and Sodome dyd synke for such lyke matter," and Langham, in his "Guardian of Health" of 1579, says "Gonor passion, for this anoynt thy yarde and clothes with camphire." An early French word *glette* meaning slime or filth, accounts for our term *gleet*. In an old book of 1742, one reads that "running at the eyes and gleet at the nostrils are signs of a cold." The impolite word *clap* appears first in English in 1587; its derivation is traceable to the old French term *clapoire* for a place of debauch, hence "la maladie q'on y attrape."

A reminiscence of mediæval psychology is aroused by seeing the phrase *common sense*; the common sense being a supposed internal sense, acting as a common bond or centre for the five external senses. So again, the occurrence of the word *temperament* reminds us of mediæval theories of medicine and the conception of the four humours contained in man's body, namely, blood, phlegm, choler or yellow bile, and black bile or melancholy, this last being a purely imaginary substance. An excess of one of these humours might cause disease, or make a man odd or fantastic, from whence we have our phrases of *humorous* and good or bad humours. The word *temperament* itself comes from the Latin *temperamentum*, or mixture, and the use of the term is but an expression for the mixture of the humours. It was but a step to conceive a mixture as nothing but a weaving or inter-twining, and from the Latin *plectere*, to weave, came the word *complexion*, having originally the same meaning as temperament. As the complexion or temperament,

be it sanguine, bilious, phlegmatic, or melancholic, could be best observed in the face, so this transition from a man's physical condition to its appearance in his face was a natural one. *Temper* was originally a word meaning a mixture or proportion of the qualities, dryness and moistness, heat and cold, of the humours, and from this we came to talk of good or bad tempered people. While we have kept the old meaning in the phrase "to keep one's temper," our other phrases of "to have a temper," and "an outburst of temper" are contradictory to that old meaning, as they imply the presence of an outburst of composure. One could give many other instances of words which have long lost their original meaning, though actual examples are not easy to find in the pages which one uses as a text. Take the word *miscreant*, we use it as a term of reprobation or invective, but etymologically it means nothing more than misbeliever, and had that sense in Shakespeare's time. The turn of a page brings in view the words *preposterous* and *garbled*. We use the former as a synonym for absurd, and a moment's reflection or analysis of the word shows that *preposterous* means the reversal of a true order of things, as by putting the first last, or the last first, in fact, it means an absurdity. In old days, to *garble* meant to sift or cleanse from rubbish, so as to select the best; in our day, we use the word as meaning to sift or pick out the worst. *Bombast* and *polite* are also words in which the secondary or figurative sense has quite extinguished or made obsolete the literal sense. We all know that, nowadays, *bombast* means solely inflected words full of sound but signifying nothing. This was its old secondary meaning, the literal being the soft down of the cotton plant or wadding with which garments were stuffed. In this sense, Gascoigne said "Thy bodies bolstered out with bombast and with bagges." *Polite* is another word in which the figurative sense has quite extinguished the literal. We still speak of polished surfaces, but do not say, with Cudworth "polite bodies such as looking glasses."

Perusal of a bacteriological article brings into prominence some words of interest. The low Latin word *testum*, from the classical *testa*, meant an earthen vessel or pot. The same was applied by the alchemists to describe the metal vessel in which they made their alloys, and Shakespeare spoke of tested gold, though we say to *test* for gold. The history of the word *alcohol* is more involved, as originally it meant a fine powder of antimony used for staining the eyelids, and was so called from the Arabic *al kohl*. We do not find the term in English until the sixteenth century, when it became used by extension for any chemical produced by trituration or

sublimation, notably for essences and distilled products. Thus, Phillips in 1706 wrote, "Alcool is the pure substance of anything separated from the more gross. It is especially taken for a most subtil and highly refined powder, and sometimes for a very pure spirit." In 1830, we find Coleridge saying, "Intense selfishness, the alcohol of egotism." The words *inoculate* and *implant* mean literally a placing in or grafting. The former comes from *oculus*, an eye, in the sense of a bud, but the word *implant* suggests the note that both *imp* and *plant* meant, in middle English, the shoot or slip used in grafting. The art of grafting was learnt from the Romans, who had a post-classical verb *imputare*, from the Greek *emphutos*, meaning implanted. Cognate to it is the Latin *putare*, to prune or cut, from which comes our *amputate* and the German *impfen*, to vaccinate. From these roots came the old English word *imp* as meaning a sprig or offshoot. Shakespeare, in his "Henry IV," says, "The heavens thee guard and keep, most royal imp of fame"; also in a letter to Henry VIII, Thomas Cromwell says, "that most noble imp, the Prince's grace, your most dear son." So also Spenser addresses the muses, "Ye sacred imps that on Parnasse dwell." In our churches at home, more than one epitaph exists to children of old nobles, beginning, "Here lies that noble imp." The word *scion* had a precisely similar significance.

On another page, one finds three interesting words, namely, *tawdry*, *gesture*, and *haranguing*. The first word had originally no depreciatory meaning; it is really a contraction derived from Saint Audrey's fair, or a festival at which cheap finery was sold, and in the "Winter's Tale" we find Shakespeare saying, "Come, you promised me a tawdry lace and a pair of sweet gloves." Next, the word *gesture*; the most famous of the old French romances are the epic poems called "Chansons de geste," or songs of exploit, the word *geste* coming from the Latin *gesta* or deeds. In England, in the sixteenth and seventeenth centuries, the term *gest* or *jest* was used in the sense of acts or deeds, and a story-book was always called a *jest-book*. Possibly, as the more favourite stories were merry tales, the word acquired gradually its present meaning of something amusing. *Zest* is quite obsolete in its original meaning of a piece of orange peel, used for giving piquancy to wine. It is of unknown French origin, and properly was applied to the inner skin of nuts and fruit. The word *harangue* is really a doublet due to the French inability to pronounce "hr" in the old high German word *hring*, that is our English word *ring*, the connection being a speech delivered in a ring or to an audience arranged in a circle. Even the word *arranged* has the same ground idea, coming through

the old French *reng* and the modern French *rang* or *rank*. Curiously enough, in Italian is the word *aringo*, which means not only a circus or riding school but also an oration, or a common loud speech.

Words constantly cropping up in the Journal are *sanitation* and *sanatorium*. In one place, one has come across the word *sanatarium*, of which it may be said there is no such word, though there is *sanitarium* used synonymously with *sanatorium*: the confusion has arisen doubtless by the first half of the one word being joined in common use with the second half of the synonymous term. Associated words are *sane* and *sanity*, which come from the same Latin root as sanitation. The word *sane* as a transitive verb, meaning to cure or heal, is obsolete, but Chaucer used it thus, "To sane the vices of flesh and of the soul." Like *sane*, the word *sanity* meant originally health or a healthy condition, without any special reference to mental health; that enlarged meaning is now archaic. As illustrative of the earlier use of the word, one finds a sentence written in 1778 which says, "His heart, livery entrails and nutriment in each state bear every mark of perfect sanity." Turning over a page, one sees the word *pulse*: how many of us realize that a humorous name for doctors in the past was pulse-pad? And that medical men were referred to as "these Pulse-pads, these Bedside Banditti"? The old word *pad* meant simply a robber who does his work on foot, that is one who took to the road, from the Dutch *pad*, meaning a path. Similarly, Scott in the "Heart of Midlothian" says, "Ye crack-rope padder, born beggar, and bred thief." The word meant also a nag or pony, as in Cowper's line, "an ambling pad pony to pace o'er the lawn," and in Tennyson's phrase "an abbot on an ambling pad." A few pages on, one sees the word *toxic*. This and many associated compound terms have their root origin in the Latin *toxicum*, which in turn is an adaptation of the Greek *toxikon pharmakon*, or poison for smearing arrows. It is curious here to see how words have got twisted in their meaning and use; *toxicum* was the Latin for poison, but the full term was the Greek *toxikon pharmakon*, or arrow poison; but only the first word was carried over and, as it chanced, it meant not poison but arrow, from *toxon*, a bow. The effect of using *toxicum* as short for the longer Greek phrase was to transfer the sense "poison" from *pharmakon* to *toxikon*, first as poison for arrows and later as poison generally. We see in this muddle, the odd etymological association of such words as *toxophore* and *toxophily*, which mean respectively the dissociated ideas of poison bearing and the practice of archery. The word

toxic is old, as Evelyn, in his "*Sylva*," published in 1664, says, "the toxic quality was certainly in the liquor, not in the nature of the wood."

The occurrence of the two words *fault* and *receipt* in near juxtaposition on another page, suggest the remark that they represent a class of words which have been subjected to a capricious and often wrong tendency to change them back to shapes more in accordance with their original spelling. Thus, the "l" in *fault* has been interpolated as a proof of its relation to the Latin verb *fallere*, and the "p" in *receipt* found its way as a token of the Latin *receptum*. Similarly, the "b" in *debt* was inserted to show its derivation from *debitum*, while the "h" in words like *humble*, *honour*, *hour*, *humour*, and *honest* was introduced in the seventeenth century in imitation of the Latin spelling, but in many cases the letter remained mute. In early English, the "h" in these words was neither written nor pronounced. We all know that in recent times the correct treatment of the initial "h" in speech is a kind of shibboleth of social grading, and has resulted in the cultivation of an educated usage in many quarters where it is not native. Other inexcusable errors introduced into our spelling by old pedantry, are instanced by *advance*, *advantage*, *scent* and *scissors* which, but for learned ignorance, should have been left as *avance*, *avantage*, *sent* and *sissors*. A converse example of mistaken etymology is the old word *habundance*, so written because it was thought to be derived from the Latin *habere*, to have; we more correctly write *abundance*, from a recognition of its derivation from *ab*, away, and *undare*, to flow.

Owing to the varied sources, our language is peculiarly rich in words of different form but expressing the same meaning. One sees the classically derived word *homicide*, which is equally well expressed by the Saxon bred *murder*; then there is *puerile* with its synonym *boyish*, and *shepherd* with *pastor*. Similarly, the words *human* and *humane* are distinct terms, but each appropriates a part of the original meaning and, moreover, instance the evolution of the conception as to the distinction between what men are and what they ought to be. A few lines farther on, occurs another instance of the same thing in the word *corpse*, which we now regard as having a distinct meaning from *corps*; then there is *flour* and *flower*, *divers* and *diverse*, also *cloths* and *clothes*, to say nothing of the fine distinctions we draw between *riding* in an omnibus but *driving* in a carriage.

Perhaps, to some, this article may seem uncalled for and prompt the query, "to what good?" The answer is that, as an attempt to direct attention to that most fascinating study, the history of words,

one does but try to stimulate a love for our native tongue, which love is nothing more than the love of our native land, expressing itself in one particular direction. If the memory of the great deeds of our forefathers, and the heritage which those acts gave, be precious to us, what can more clearly point out that their native land and ours has fulfilled a glorious past, than the fact that its people have acquired a clear, strong and noble language? Within the limits of an article of this kind, no attempt has been made to explain the stages through which that language has passed, the sources from which its riches have been derived, the losses which it has sustained, the perils which are threatening it, and the capabilities which yet are latent within it. The study of these should be the worthy ambition of us all, because the present is only intelligible in the light of the past. No language has more anomalies in it than ours; anomalies which the logic of grammar fails to explain, and which nothing but an acquaintance with its historic evolution will enable us to understand. As the result of long contests against the combined power of many intruding foes, our language has lost the nice distinctions by inflection and termination, the means of denoting difference of gender, some of its power of inversion in the structure of sentences, and almost every word is attacked by the spasm of accent and the drawing of consonants to wrong positions. Still, in spite of these it has a charm of its own, and to each one of us of the educated classes, the care of the national language is a sacred trust.

We need to remember that the nation which allows her language to go to ruin, parts with the best half of her intellectual independence, and testifies her willingness to cease to exist. English is becoming different from what it has been, but different only in that it is passing into another stage of its development, much as the fruit is different from the flower and the flower from the bud. The language may not have in all points the same excellencies which it once had, but still it possesses excellencies as many and real as it ever had; there may be less beauty but more utility. All its discards are not losses any more than all its additions are gains. The gains are only in words, but the losses are both in words and in the power of words, by loss of inflection. We need to see that both forces interact towards betterment in conformity with the real genius of the language, which is virility and clearness. Our duty is to know our language in all its history, and bequeath it to those who come after us not worse than we received it ourselves. In respect alike of our country and of our speech, let our motto be, "*Britannicum nactus es; hanc exorna.*"

Royal Army Medical Corps, Rouen Medical Society.

A MEETING of the Medical Officers attached to the R.A.M.C. Units stationed at Rouen, was held on Saturday, January 16, 1915, at No. 11, Stationary Hospital, for the purpose of inaugurating a Society for the reading and discussion of papers and matters of medical and surgical interest.

The Chair was taken by Colonel B. M. Skinner, M.V.O., and there was a large attendance, including representatives of all the hospitals stationed in Rouen.

It was resolved that the Society meet on alternate Saturdays, until further notice, the place of meeting to be No. 11 Stationary Hospital. Lieutenant Beckwith Whitehouse was elected Secretary of the Society.

FROST-BITE.

Brevet-Colonel C. B. LAWSON read a paper on "Frost-bite," based upon experience derived from cases of the disease treated at No. 8 General Hospital. The speaker emphasized the importance of the subject, both from a military and medical standpoint, and urged that prophylactic measures be adopted to prevent the further occurrence of the malady amongst troops now in the trenches; and he thought that many of the cases might have been prevented if adequate prophylaxis had been adopted. The measures he advocated were the application of some animal oil or fat to the feet and legs, and the better protection of the lower extremities by waterproof Jackboots. The pathology, symptoms and treatment were discussed in turn. Clinically Colonel Lawson recognized two types of disease, viz.: (1) Objective, in which the toes or feet were œdematous, swollen, discoloured or actually gangrenous; and (2) subjective, where physical signs were confined to acute tenderness and hyperæsthesia of the parts involved, and all objective lesions were absent.

As regards treatment, the speaker had found the application of an ointment containing equal parts of turpentine and lanolin very efficacious for the objective variety. Acute pain was relieved by aspirin and phenacetin, and caffein cit., and elevation of the extremities. Owing to the exigencies of the campaign it had been impossible to keep the cases in hospital sufficiently long to ascertain the ultimate result of treatment. However, in no case had it been necessary to amputate any part of an extremity, and Colonel Lawson strongly deprecated any operative measure in the routine treatment of the condition.

Mr. J. SKEFFINGTON, Senior Surgeon to the British Red Cross Hospital, Rouen, contributed notes based upon cases of frost-bite treated at No. 2 British Red Cross Hospital. He divided cases into three groups, as being a convenient basis for classification. (a) Cases of the first degree, e.g., those that show to the eye little tissue damage; (b) those in which there are obvious gangrenous patches, particularly where pressure

has occurred; (c) more advanced cases, in which the process has gone on to vesiculation and inflammation. In Group *a*, the sensation is disturbed and patches of hyperæsthesia are mixed with areas of anæsthesia. These cases the speaker compared to leprosy, the shooting pain along the nerve trunk suggesting an element of neuritis from cold. In Class *b* the gangrene was of the dry variety, and frequently the pain was not so great as in the cases classed under the first degree. In Class *c* the vesicles appeared to start at the edge of the gangrenous area and were serous. Mr. Skeffington did not think that sepsis had any place in their causation. As regards treatment the method he had adopted was to cleanse the feet thoroughly with tepid water and soap, dry thoroughly, apply boric acid and separate the toes by strips of sterilized gauze. A thick covering of cotton-wool was then placed over the whole foot. A hot-water bottle was allowed near the foot, but not in close contact. Blisters were pricked and emptied and dressed with aseptic gauze. To relieve pain the speaker had found an opium pill, 1 gr., repeated in a couple of hours, to be of most use. Aspirin gave relief as a rule for a short time only, and the same might be said of morphia.

Mr. Skeffington deprecated immediate operation in all cases, even the worst lesions improving very much as the result of conservative treatment.

Colonel Sir BERTRAND DAWSON observed that in his experience the pain in these cases of so-called frost-bite appeared to be always worse at night. It was most marked along the inner border of the feet, and was usually limited to one of four sites, viz., the root of the big toe, the level of the tarso-metatarsal joint, the heel and the ankle. Definite patches of anæsthesia and hyperæsthesia were present, but these followed no definite distribution. As regards treatment the chief indications were to relieve pain and allow sleep. Opium should be given in doses of the tincture *℥xv* three or four times in the twenty-four hours, as long as the pain persisted. Of local applications, turpentine appeared to give the best results. The limb should be thoroughly cleansed, turpentine liberally applied, and a light bandage fixed over the affected parts. In the cases he had seen treated with turpentine no toxic symptoms had appeared.

An important question in discussing the subjective cases of frost-bite was the possibility of malingering. He believed that the large majority of cases recently admitted to the hospitals in Rouen had been real. Probably when the patients were convalescent, in some cases a tendency to magnify the symptoms might develop, but on the whole he believed that so far malingering had not been a great factor. The real cases might be tested by ascertaining the areas of greatest tenderness, and testing the loss of sensation with the eyes closed.

Lieutenant-Colonel NASH asked if any means could be devised to trace the after histories of the patients that had passed through the various units. Only in this way could the value of different methods of treatment be appreciated.

Lieutenant GREENFIELD discussed the morbid anatomy and pathology of the condition, which he attributed to venous stasis. Treatment should be directed to increasing the circulation in the parts affected, and in the third stage of the disease massage might prove useful. He also advocated the employment of ionic medication on account of its rubefacient effect. He criticized one of the statements that had been made, viz., that blebs on the surface of the parts should not be incised. It was impossible to keep the fluid in these blebs sterile, and he therefore strongly advised that the cuticle be removed as in the case of burns. With regard to skin grafting he thought that the results would be disappointing owing to the continued pressure exerted upon the parts subsequently.

Major HALL referred to the cases of "frost-bite" which he had seen at Boulogne. He quite agreed that the condition was a vaso-motor disturbance, and should be treated as such. When the condition was first seen, the advice of Canadian officers was sought, and they advised the application of turpentine or picric acid if the skin was broken. The speaker agreed that operation was bad treatment, and a line of separation should form in every case before it was entertained. Pain appeared to be a very real factor in the condition, and in some cases was appalling. The disease was followed by a peripheral neuritis, and certainly ionic medication and massage should do good.

Major Hall firmly believed that if adequate protection was afforded to the feet frost-bite would not occur. He suggested that two pairs of socks be worn for ordinary use, and in cold weather the number be increased to three, the boots being proportionately large. He did not think that gum boots would be so effective as the ordinary leather type.

Colonel Sir BERKELEY MOYNIHAN observed that these cases of so-called frost-bite were the most interesting of any that he had seen since his arrival in France. Three factors were necessary to produce the condition, viz., cold, damp, and pressure. Cold in itself was not sufficient, as shown by the fact that the nose, ears and hands were not attacked. The preponderating factor in the cases that he had seen was damp. Pain was a most distressing feature, and he believed that the account of the men in respect of this symptom was absolutely trustworthy. The immediate discomfort was the result of too rapid thawing. In Switzerland and Norway, where he had seen cases of true frost-bite, the affected parts were never allowed to thaw rapidly. Colonel Dawson spoke of the work of Alexis Carrel and Tuffier in implanting organs maintained in cold storage for some weeks into living tissues. The latter reacted in precisely a similar manner to the condition here described as frost-bite. The tissues, in fact, become very hyperæmic and tender, at the site of the graft. He was, therefore, very sceptical when he heard the symptoms attributed to neuritis.

Turning to the question of treatment, pain was most easily relieved by keeping the feet cold and uncovered. If they were wrapped in wool and bandaged all the patients complained of stabbing shooting pains.

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The pain was directly proportioned to the warmth of the parts. Since the parts had been kept cool the administration of morphia had not been necessary.

The speaker was interested to hear that turpentine had proved useful. It was a reversion to the work of William Hey, who used to dress wounds with a mixture of olive oil and turpentine with considerable success.

Lieutenant B. T. LANG did not think that the disease under discussion was solely due to cold. He attributed it rather to damp, and cited the case of French soldiers who suffered from precisely a similar condition, and who had stood in water over a lengthy period, but were not exposed to frost. He attributed the beneficial effects of turpentine to its slightly irritative effect and its mild antiseptic action from absorbed oxygen. The percentage of suppurating cases has been proved to be less after preparation of the skin with turpentine than with ether.

He did not agree with the remark of a previous speaker that skin-grafting would prove useless to repair the sole of the foot, and referred to a case in which it had been successfully employed after an extensive burn of the foot.

Colonel SKINNER thought that probably another factor apart from cold was involved in the etiology of the condition, and suggested that septic infection might be the cause. If this were so the water in the trenches would be a ready means of spreading the infection. He referred to an instance that occurred in South Africa when 900 men out of one trench developed an acute infection of the feet of obscure nature through standing in foul water. Modern methods of research should be applied to the cases now occurring in France, and many problems were at present awaiting solution by the pathologist.

THE USE OF X-RAYS IN GUNSHOT WOUNDS.

Lieutenant B. T. LANG read a paper upon "The Use of X-rays in Gun-shot Wounds with Especial Reference to Localization of Foreign Bodies." The paper was illustrated by plates and diagrams. The speaker, after enunciating the general principles underlying radiography, proceeded to explain the essential differences between rays of hard and soft penetration. Bullets are quite opaque to all kinds of rays, and therefore if location only is required any ray capable of fogging a plate or turning a screen fluorescent may be used. If, on the other hand, details of damage done to the bone and soft tissues are necessary, a "soft" tube must be employed. Where damage to bone is suspected he considered a screen examination totally insufficient.

Lieutenant Lang then described the methods available for the exact localization of foreign bodies, laying particular stress upon the importance of taking a stereoscopic record. From such plates localization can be effected not only graphically but also mathematically.

The paper was discussed by Captain Gouldsbrough.

Clinical and other Notes.

A NOTE ON FEVERS RESEMBLING SAND-FLY FEVER AT SINGAPORE.

BY CAPTAIN A. C. H. SUHR.

Royal Army Medical Corps.

WITHIN a few weeks of arrival at Singapore I began to be struck by the occurrence of a certain number of febrile cases bearing a marked resemblance to phlebotomus fever as seen in Malta. While, however, the diagnosis was a comparatively simple affair in Malta, where a few weeks' experience enabled one to recognize the fever as a definite entity from the clinical picture presented, away from Malta the recognition of the disease is influenced by the fact that no micro-organism is to be seen in the blood or elsewhere, and dependence must be placed on the clinical picture. In a malarious place such as Singapore, the diagnosis is difficult for various reasons. To elaborate a little. It is a matter of common knowledge that many a febrile attack, which cannot reasonably be doubted to be malaria, may not show the presence of the parasite. This scantiness or absence of the parasite from the peripheral blood may be due to the action of quinine with which (apart from that issued prophylactically) so many men dose themselves as soon as they feel that an attack of "ague" is impending. But undoubtedly a man who has not been taking quinine at the commencement of his illness may show the same curious absence of parasites from the peripheral blood. It is also well known that men who have had an attack of malaria—proved by the presence of the parasite—are for a long time liable to short attacks of fever in which very often the parasite cannot be found. Some of the cases of fever lasting about three days, and commonly labelled "malaria," may very well be phlebotomus fever; and one might almost wonder whether in some of the cases so markedly different from the clinical picture of malaria the stray parasite or so revealed by a prolonged search is in fact the offending agent. Charts and case-sheets have been kept of every case of fever during the year, and the number of cases that have lasted just five days is very curious.

From the above reasons the field of safe investigation is very much narrowed down, and in the present instance has been confined almost entirely to men of the draft who arrived from home in 1912. A very large proportion of these had not been exposed before to chances of malarial infection, and were hence fair field. It was interesting to observe what befell these men in the next few months.

A proportion got malaria, the benign tertian, malignant tertian, and the quartan parasite being found in their blood. A proportion again got

"pyrexia." Their charts were typical of mild attacks of benign tertian malaria, yet they did not show the presence of the parasite. As some of these men were stationed on an island, Pulan Brani, which is almost free from malaria and where prophylactic quinine had not been issued, it is curious to speculate upon this absence of the parasite, or even its extreme rarity if it was indeed missed in prolonged and repeated searches. A third class was observed, however, and in this are included the cases of interest from the point of view of their possibly having been phlebotomus fever.

The majority of these cases were from Pultan Brani which, as has been mentioned, is almost free from malaria, whilst Blakan Mati, half a mile away, is highly malarious. These cases showed neither the presence of the parasite nor temperature charts that resembled malarial pyrexia in the very least, and they were nearly all men of the new draft who had never had malaria and were therefore unlikely to have such markedly atypical first attacks. Their charts showed, as a rule, a rise to 101° to 102° F., falling gradually to normal by about the third or fourth day. The symptoms were indistinguishable from the picture of sand-fly fever in Malta, the muscular pains, aching and injected eyes, very dirty tongue, and so on. In Malta these cases would have been diagnosed as sand-fly fever without hesitation. In most, exposure to the sun could be eliminated owing to the conditions under which they worked, an important point, I think. There is thus a class of case found here strongly resembling sand-fly fever.

Malaria is not the only disease from which a differential diagnosis has to be made, and another which in many ways presents more difficulties is dengue. The greatest difference of opinion exists among local medical men as to the presence and frequency of dengue in Singapore. In one large hospital I was told there were no cases among a large number of patients. In a second the staff "saw occasional cases"; while other hospitals and some private practitioners have "numbers of cases." This diversity of opinion may, of course, be due to differences in the distribution of the disease and its epidemic character; but I am convinced that the personal factor in diagnosis accounts largely for this difference.

Attempting to apply what I had learnt, I soon found that there were some cases (falling under the stipulated category for investigation) which I felt justified in labelling dengue with some certainty. Unfortunately with dengue, just as with malaria, the few pathognomonic or distinguishing features may apparently be absent, yet I am inclined to the opinion that dengue is recognizable in most cases, leaving, however, a number which in the dim light of present knowledge are indistinguishable from phlebotomus fever.

I have caught many flies of the small varieties which are commonly called sand-flies; not one has proved to be a phlebotomus. I have tried to breed them from the earth and debris taken from places likely to harbour

them, and my search for them has so far been uniformly unsuccessful, yet it is only too likely that they are here. I have been bitten by small flies on still evenings; killed such flies and looked at them; and the so-called sand-flies were not phlebotomi. It is to be noted, however, that I am stationed on Blakan Mati which is twice as far from the main island of Singapore as Pulan Brani, where, in my opinion, the majority of these cases occur. Knowing the weak flight of the phlebotomus it is a priori not to be expected that he can fly over to Blakan Mati even on the stillest night, and therefore one's chances of finding it there are reduced. Secondly, the character of Blakan Mati, an island with much tropical vegetation where everything becomes covered with green in a few weeks, is the exact antithesis of Malta. Though it is quite possible that tropical vegetation may provide as snug a home as can be found in Malta. Pulan Brani is not very different, less jungle-covered but still green all over. The flies I caught there (and they were not very many) yielded no better results.

A CASE OF SHRAPNEL BULLET IN THE SPINE; PARAPLEGIA; LAMINECTOMY; PARTIAL RECOVERY.

By C. HAMILTON WHITEFORD, M.R.C.S., L.R.C.P.
Specialist in Surgery, Military Hospital, Devonport.

ON September 14, 1914, a soldier, aged 26, while in action in France, received a shrapnel wound of the back, causing instantaneous paralysis of both legs.

Condition on Admission.—Four days after the injury. Bullet wound: At the level of the first lumbar spine, one inch to the right of the middle line. No deformity. Anæsthesia: Right side, complete from iliac crest to toes; left side, from knee to toes, with diminished sensation in thigh. Paralysis: Right thigh and leg, complete; left thigh and leg, very slight voluntary movement of toes only. Reflexes: Right leg, absent; left leg present, but diminished; urination involuntary; defæcation unconscious.

There was a pressure sore over the right trochanter. The skiagrams showed a shrapnel bullet in the body of the first lumbar vertebra.

Ten days after the injury, the patient's condition being unaltered, I performed the following operation:—

Operation.—The bullet track was packed with gauze soaked in tincture of iodine.

The spine was exposed through an eight-inch vertical incision, three-quarters of an inch to the right of the spinous processes, the centre of the incision being opposite the first lumbar vertebra. The laminæ and spinous process of the first lumbar vertebra were removed with bone forceps. The bullet had passed through and comminuted the right

lamina. The theca was opened, and the cords of the cauda equina were found intact. Stimulation of these cords produced strong retroflexion of both thighs. The theca and cord were retracted to the patient's left, and a shrapnel bullet was removed from the posterior surface of the body of the first lumbar vertebra, in which the bullet was half buried.

In view of possible sepsis from the bullet track, the small opening in the theca was not sutured. The muscles, fascia, and skin were sutured in layers, without drainage. The bullet track and skin incision were swabbed with tincture of iodine.

After-treatment.—Urotropine was given by mouth, and hypodermic injections of morphia controlled the pain, which was chiefly in the right leg. Rectangular poroplastic splints were applied to the feet and ankles to prevent foot-drop. Both thighs and legs were massaged daily.

Post-operative History.—The skin incision healed perfectly. Clear cerebrospinal fluid escaped in large quantities from the bullet track, which was swabbed daily with tincture of iodine, and gradually ceased with the healing of the bullet track, which closed on the thirtieth day. A small pressure sore, caused by escape of urine, developed over the sacrum and took many weeks to heal.

7th day after operation: Shooting pains in both legs; right leg, full sensation down to centre of thigh; left leg, full sensation down to toes. 14th day: Right leg, slight voluntary movement of muscles on inner side of upper thigh, with shooting pains in lower thigh; left leg, complete return of sensation and movement in whole limb; bladder and rectum, moderate perception of urination and defæcation. 34th day: Right leg shooting pains extended to heel. 46th day: Right leg, shooting pains reached the toes.

Present Condition (17 weeks after operation).—Right leg: Some power in upper thigh muscles, which are less flabby. The rest of the thigh and leg is in flaccid paralysis. During the last three weeks full tactile sensation has extended to the level of the lower border of the patella. There are still shooting pains extending into the toes. Left leg: Sensation and movement normal. Bladder: Fair control, but some precipitancy, more marked at night. Rectum: Control normal.

Further Note (24 weeks after operation).—Control of bladder is now complete. In the right leg, during the last seven weeks, sensation has been unaltered; in the muscles above and below the knee, both in front and behind, there is slight, but quite definite, voluntary contraction. The patient is beginning to get about on crutches.

**ADAPTATION OF A RAILWAY PORTER'S TRUCK FOR THE
CARRIAGE OF WOUNDED.**

By MAJOR N. E. HARDING.
Royal Army Medical Corps.

AMONG the many ingenious devices I have seen in the course of the inspections of the London Voluntary Aid Detachments, I was particularly struck with the suitability of this for moving patients able to sit up, but otherwise helpless, on long smooth surfaces such as railway platforms. The illustrations make it perfectly clear, I think, but all that is needed



is an ordinary porter's truck and an ordinary folding camp chair with arms, costing about four shillings. The back legs of the chair are sawn off just below the rivet joining them to the front, and the front legs, if not long enough to reach the footplate of the truck, can rest on a bar of wood of the required thickness. Two rather wide brass coathooks

screwed into the middle rail of the chair upside down behind serve to attach it to the centre bar of the truck. A small block of wood can be screwed on to the underside of the bar on which the legs rest at each end to prevent it shifting. If thought advisable, the chair can in addition be lashed at the back to the truck. If a headrest is needed, a bar can



easily be lashed on to the truck at the required height. It will be found that a woman or child can transport a heavy man without fatigue in this manner.

The description and photographs I owe to Mrs. Thorp, of V.A.D., London, /50, who invented it.

A CASE OF LYMPHOSARCOMA.

BY MAJOR C. E. POLLOCK AND CAPTAIN G. ORMROD.

Royal Army Medical Corps.

STOKER W., aged 31, H.M.S. "Highflyer," was transferred to the Military Hospital, Sierra Leone, on November 9, 1914, with a history of illness dating from October 10, when he first came under the observation of Staff-Surgeon Hill, H.M.S. "Highflyer." The patient then complained of cough, with loss of weight and shortness of breath. He had an evening rise of temperature varying between 100° and 101° F. (*see Chart*). There were signs of an old effusion on the left side of the chest, and also of enlargement of the mediastinal glands. He was very anæmic and complained of weakness. There was obstinate constipation.

On admission to the Military Hospital, Tower Hill, he gave the following history: He has had no illnesses since joining the Service. When aged about 15 he had a severe illness which lasted about two months; he was unable to furnish any particulars of this illness. He denied having had syphilis.

About two months ago he first began to feel ill; he felt pain across the shoulders, and suffered from shortness of breath. He also had a severe cough which lasted fourteen days, but cleared up on treatment. Soon after this he felt weak and unable to do even light work. He stated that he had lost weight during the last two months, but had not had any spitting of blood or night sweats.

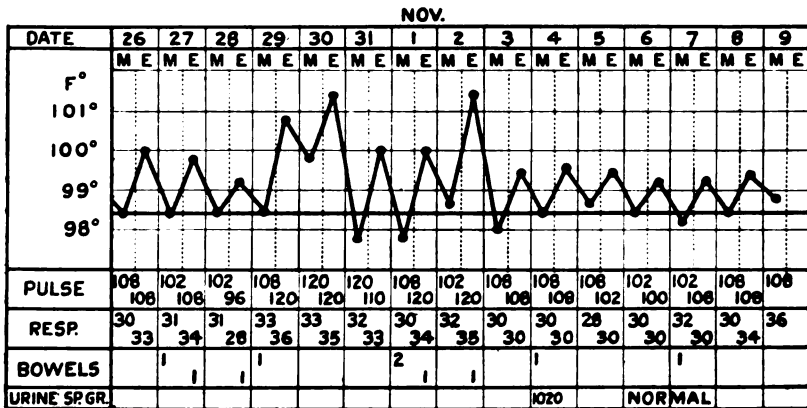
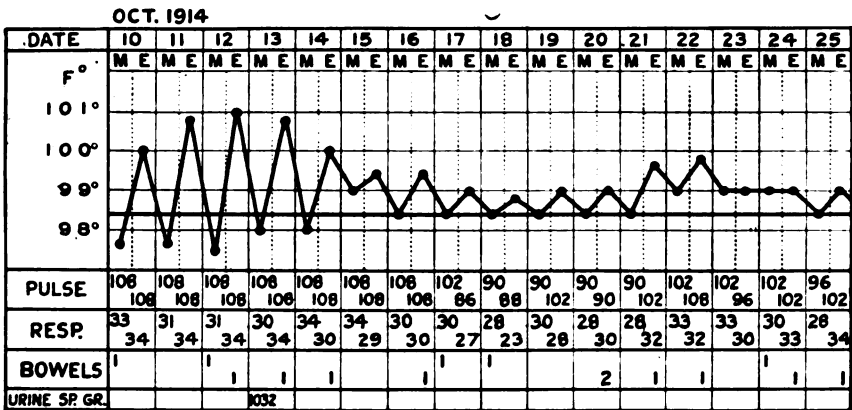
On November 23 he complained of slight cough, shortness of breath, difficulty in swallowing, and slight diarrhoea of three days' duration. He had not had any vomiting, pain, night sweats, or difficulty in urinating. His appetite was good, and he was sleeping fairly well. His vision was unimpaired; there was slight cyanosis of lips, with extreme pallor of the cheeks.

Objective Examination.—The patient preferred to lie on his left side. He was anæmic, and the face had a puffy appearance owing to extensive œdema, especially of the left side of the head and neck, and to a lesser degree on the right side. His breathing was laborious and rapid, but he preferred to lie without any support in the nature of pillows, etc. The œdema extended downwards over the neck and tract of the left chest, becoming less marked towards the upper limits of the abdomen, but observable as far as Poupart's ligament of the left side. The œdema was not so marked posteriorly, but the intercostal spaces were obliterated. There was no œdema of the feet and ankles. Dilated venules were visible over the precordial region and, to a lesser extent, in the axilla, as also over the area corresponding to the base of the left lung.

The examination of the chest revealed the following conditions:—

On palpation there was practically no expansion of the left lung, and there was tenderness on pressure over the œdematous area in front and in the axilla.

On percussion there was complete dullness, but not of a strong character, over the whole of the left side of the chest. The cardiac dullness was continuous with the dullness of the lung, and this extended three-quarters of an inch beyond the right sternal border, and as high as the inner end of the right clavicle. The left apex was dull; the lower margin of dullness corresponded to a line drawn from the xiphoid cartilage to the costal margin in the left mid-axillary line. There was tenderness on pressure over the whole of the œdematous area of the chest, in front and in the axilla, and also over the stomach.



Auscultation.—There was complete absence of breath sounds over the whole of the front of the lung. A few fine crepitations could be heard behind at the base of the lung, but the breath sounds were practically absent. There was considerable loss of vocal resonance. On the right side, back and front, the breath sounds were extremely loud, and the

vocal resonance was increased. There were a few fine crepitations at the base of the lung.

Heart.—The heart sounds were feeble and rather muffled in character. There was no cardiac murmur, but the condition of the chest wall seemed to somewhat deaden the sounds. The pulse was rapid—108—the tension low.

The temperature varied between 100° and 97° F. and showed considerable irregular fluctuations.

The *spleen* was not enlarged.

The *liver* was somewhat enlarged, about one-half to three-quarters of an inch below the costal margin, but was not tender on pressure.

Kidneys.—Albumin was present in small quantities, but no blood. There was no difficulty in urinating.

Lymphatic Glands.—There was no enlargement of the lymphatic glands in the groin or axillæ. The glands in the right axilla could just be felt on deep palpation. There seemed to be some enlargement of the left cervical glands, but this was difficult to make out owing to oedema.

Mouth.—A slight degree of pyorrhœa alveolaris was present.

The *sputum* was scanty, white, and frothy; tubercle bacilli could not be found in it.

Blood.—A differential count on November 19 showed:—

					Per cent.
Polymorphonuclears	..	..	..	..	11
Lymphocytes	..	..	..	..	86
Large mononuclears	..	..	..	..	2
Transitionals	..	..	..	..	0·5
Eosinophiles	..	..	..	..	0·5
Two nucleated reds.					
Poikilocytosis.					

November 20.—Leucocyte count: 40,310 per cubic millimetre.

November 21.—Hæmoglobin: 40 per cent.

November 22.—Red cells, two counts: 1,840,000 and 1,920,000 per cubic millimetre.

November 23.—A differential count showed:—

					Per cent.
Polymorphonuclears	..	..	..	..	9·3
Lymphocytes	..	..	..	..	87·6
Large mononuclears	..	..	..	..	2·0
Eosinophiles	..	..	..	..	0·6
Transitionals	..	..	..	..	0·3
Two nucleated reds.					
Poikilocytosis.					

Treatment.—He was given a liberal diet. A mixture containing iron and arsenic was ordered, and his bowels were kept open.

Subsequent notes by Fleet-Surgeon H. Whiteside, Royal Navy, at the Royal Naval Hospital, Devonport.

The patient made rapid improvement during the voyage home and also during the first week or two in hospital. The œdema diminished and the anæmia was less intense (*vide* blood counts). Later, however, lymphatic and venous obstruction became marked. The left lung was quite collapsed, and signs of mediastinal tumour were very evident. Thoracentesis was necessary twice, as well as drainage of the arm by Southey's tubes.

On December 29 he had an attack of acute heart failure, but rallied under strychnine and digitalis, and remained fairly comfortable until January 9, when he had a similar attack, and died in about twenty minutes.

Post-mortem Report.—A large sarcomatous mass was found affecting the mediastinal glands; the main tumour weighed forty-six ounces. The bronchial glands were all greatly enlarged, and on section showed hæmorrhagic patches. The left lung was entirely collapsed; the pleura infiltrated and thickened, especially posteriorly where the parietal pleura appeared to be continuous with the mass. The mesenteric glands were similarly affected, and the chain of glands along the whole length of the vertebral column was infiltrated. Fluid was present in the pleural and pericardial sacs and also in the peritoneal cavity. There were no secondary growths in the abdominal viscera. The brain was not examined.

Staff-Surgeon Sutherland, H.M.S. "Empress of Britain," saw the case with us, and came to the same conclusion as regards diagnosis, and Fleet-Surgeon Whiteside, Royal Naval Hospital, Devonport, kindly supplied the subsequent notes of the case and the post-mortem report.

A FORM OF FOLDING TRESTLE FOR CONVERSION OF A STRETCHER INTO AN IMPROVISED BED.

BY CAPTAIN D. MACFADYEN.

Royal Army Medical Corps (S.R.).

WHEREAS General and Stationary Hospitals are provided with beds, Clearing Hospitals, which are more mobile units, are only supplied with stretchers for the accommodation of patients. During the present war it has been found that the accommodation of seriously wounded cases on stretchers simply placed on the floor, especially when they have to remain on them for several days, is objectionable for several reasons.

I have, therefore, at the request of Major F. A. Symons, O.C., No. 1 Clearing Hospital, devised a form of trestle for the support of a stretcher at a height of 20 inches from the floor. Each stretcher rests on a pair of trestles placed one at each end. The wood used in the construction of

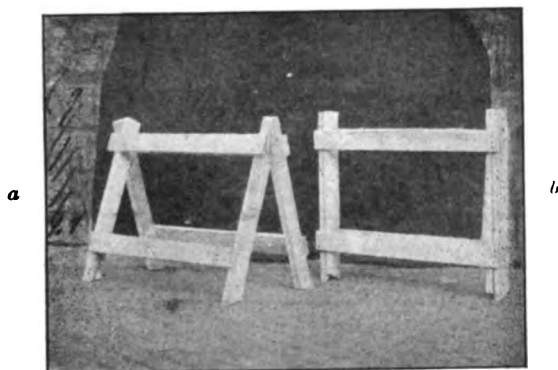


FIG. 1.—Trestle. (a) open, (b) closed.

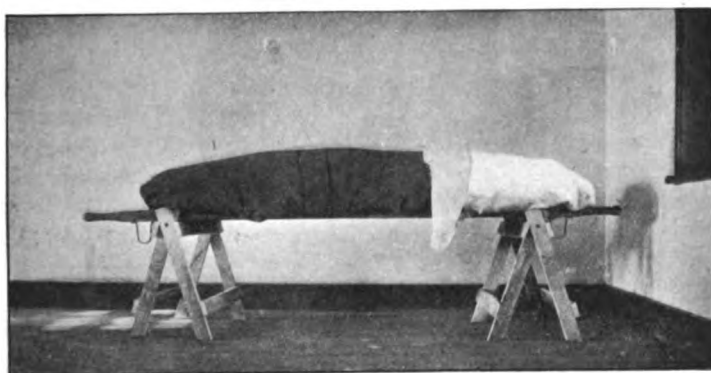


FIG. 2.—Bed improvised from trestles and stretcher.

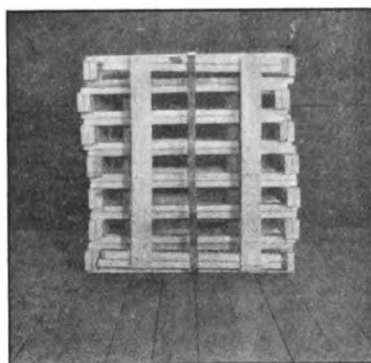


FIG. 3.—Bundle of eleven trestles packed for transport.

these trestles is $2\frac{1}{4}$ inches by 1 inch in section. A trestle is composed of two halves, an inner and an outer. A half trestle is composed of four pieces of wood, two legs 23 inches long, and two cross pieces 27 inches long. The two legs are fixed parallel to each other by the two cross pieces, which are also parallel, by three nails at each junction so that in the case of the inner half the outer surfaces of the legs are 25 inches apart, and in the case of the outer half, 27 inches apart. The point of attachment of the cross pieces to the legs is 4 inches from the upper and 5 inches from the lower ends. The two halves of the trestles are fixed together by two round bolts ($\frac{3}{8}$ inch in diameter) passing through the legs, $2\frac{3}{4}$ inches from the upper ends. The lower ends of the legs are cut across obliquely so that they rest flat on the floor when the trestle is opened.

When opened to support a stretcher the posts of the legs above the upper cross pieces lock against the upper surface of the upper cross pieces and so prevent the trestle opening any wider. When closed the inner half of the trestle fits inside the outer half, and the whole trestle occupies no more space than does the outer half, except for the two cross pieces of the inner half. When packed for transport seven closed stretchers are laid flat one on top of the other, and in the space so formed two more are placed on end, and between the projection of the legs at each end another trestle is placed on end. The bundle of eleven trestles so formed is lashed round with a strap or rope. Each trestle weighs 8 lb., so that a bundle of eleven weighs 88 lb. This can easily be lifted by one man and carried by two men. The place occupied by a bundle of eleven trestles is 9.7 cubic feet.

These trestles have now been in use in No. 1 Clearing Hospital for over a fortnight and have proved very efficient. At present they are in use on one side of one ward, which has ordinary iron bedsteads on the other side, and wounded men who have been accommodated first on one and then on the other, all state that they prefer the bed improvised from the stretcher and trestles to the bedstead, even although there are flock mattresses on the latter and none on the former. The improvised bed looks flimsy, but it has been tested with two men moving about on it and found absolutely steady.

In my opinion, the advantages of the bed formed from a stretcher placed on trestles over a stretcher placed on the floor are as follows :—

(1) It is possible with the improvised bed to keep the floor below and around the stretcher clean without moving the stretcher and so causing the patient annoyance and perhaps pain. This is, I think, an important advantage, especially in the case of patients with serious wounds.

(2) It is much easier to dress cases efficiently on a raised stretcher than on one on the floor, and there is less risk of infecting the wound when doing so.

(3) On the raised stretcher the patient is not exposed to cold draughts of air coming in below doors, etc., to the same extent that he is when lying on a stretcher on the floor.

(4) The appearance of a ward filled up with beds improvised from stretchers and trestles is more pleasing than one with stretchers on the floor, and this has a beneficial effect on the patients.

I also consider that the bed improvised from a stretcher and trestles has the following advantages over an ordinary light iron bedstead:—

(1) That it is more portable.

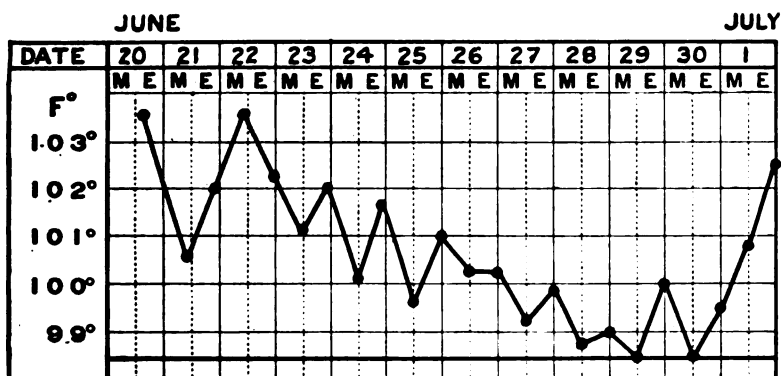
(2) That the patient suffers less pain when he has to be moved from one place to another, as he does not require to be shifted off the stretcher on which he is lying.

ABDOMINAL SUPPURATION CO-EXISTING WITH MEASLES.

By MAJOR N. E. HARDING.

Royal Army Medical Corps.

ON June 19, 1914, a child, S. E., aged 8, developed a typical attack of measles. As will be seen from the chart taken by the mother, an intelligent woman, the temperature did not fall as rapidly as usual, and during the course of the disease the child complained several times of abdominal pain, but as palpation was always negative, and the pain was



in the splenic region it was ascribed to congestion of that organ. She also complained once or twice of pain and difficulty in micturition which was put down to scantiness of the secretion and consequent scalding. On the 29th she appeared to be quite convalescent, and so was not visited till July 1, when I found she had had a very bad night owing to abdominal pain, and that her temperature had shot up to close on 103° F. On examination I found the abdomen in the right iliac region board-like and so tender

that the child cried on touching it. I accordingly got her admitted to Guy's Hospital, and she was operated on that evening by Mr. Philip Turner, who evacuated a large abscess in the region of the appendix, extending into the pelvis and holding approximately a pint of pus which gave a pure culture of *Bacillus coli communis*. Owing to the child's condition the appendix, which was somewhat inflamed, was not removed, but a drainage tube was inserted.

For some days she appeared to be doing fairly well though complaining a good deal of pain and very marked constipation, but on the 11th the temperature rose, and on the 17th Mr. Turner operated again and found an abscess walled off by dense adhesions between the rectum and the right (?) ovary containing about an ounce of pus, which also gave a pure culture of *B. coli communis*. The appendix again did not show very marked signs of disease, but was removed, and a drainage tube again inserted. Since the second operation the child has made steady if somewhat slow progress towards recovery.

The case appears to be of some interest on account of the trifling symptoms produced by the extensive suppuration and the way in which the temperature fell to normal and the child apparently convalesced, although this large abscess must have been present most if not all of the time. There also appears to be some doubt as to where and how it originated. The causal organism suggests the appendix, but that organ showed little evidence of disease.

TINCTURE OF IODINE AND THE PREVENTION OF VENEREAL DISEASES.

BY MAJOR M. F. FOULDS.

Royal Army Medical Corps.

WE are all of us aware how, recently, the diagnosis and treatment of venereal diseases has loomed up in both the lay and medical press, and how much work and time has been given to the subject by members of the profession, but with it all very little has been said as to the prevention of these diseases. Personally I am of opinion that, if as much thought and research had been given to prevention as has been given to the cure, we should have progressed much further to the solution of the problem, and it is our own sex and not the opposite, for obvious reasons, to whom we owe this duty.

The mucous surface of the male generative organ is much smaller in extent and much more tightly bound down to the underlying structures than that of the female, and is, therefore, easier to sterilize, and experience teaches us that the vulva and vagina of the female are practically incapable of being freed from venereal organisms by ordinary

simple means when once infected ; therefore it is the male members of the community whom we must endeavour to protect.

After a number of years' experience with calomel ointment, permanganate of potash and other antiseptic washes with unknown success I have lately been advising the men (in lectures on personal hygiene) to apply generously tincture of iodine (1 in 40) to the mucous surfaces of the glans penis and retracted prepuce and to pass the small brush through the meatus into the fossa navicularis as soon after connection as possible, to be followed by a second application of the same twelve hours later. I generally advise all men to buy a small rubber-corked half-ounce bottle of tincture of iodine and a small camel-hair brush and keep them in their holdalls, and enlarge on the application of the iodine to all cuts, chaps, abrasions and blisters, etc., besides using it as a preventive against venereal disease. I am aware that there are many medical officers who consider that it should be supplied to the men as part of their kit on enlistment, and the individual instructed in its use whilst attending the gymnasium, where he comes into much more intimate contact with members of the Service, than at any other stage in his military career.

I do not pose as a bacteriologist, and have no knowledge of how tincture of iodine acts on the organisms of venereal disease, but, arguing by rule of thumb, if it will prevent staphylococci and streptococci of the skin, &c., from infecting an abdominal or other operation wound, why should it not prevent venereal infection, provided it is early and thoroughly applied? I have no means of knowing what success tincture of iodine has had in the prevention of the disease at this station ; all I can say is that the admissions for venereal disease have gone down since the men were lectured on the subject, and I have brought the matter forward simply with a view to its publicity and further trial at other stations, also as a line of research for specialists in bacteriology. I may add that in the treatment of venereal warts the daily application of tincture of iodine acts like a charm, and saves all cutting and burning treatment, which is generally advised in text-books.

Mémoir.

A MEMOIR OF THE LATE LIEUTENANT-COLONEL CHARLES DALTON, R.A.M.C.

By RICHARD F. TOBIN, F.R.C.S.I.

Brigade-Surgeon, Army Medical Service (Retired).

IMPELLED by the influence which Lieutenant-Colonel Charles Dalton, R.A.M.C., exercised and will ever exercise over those who had the good fortune to know him, I have written this brief Memoir.

Conversations with his comrades have shown me that we are all, as regards our loss, under a like experience; it may be described as a mixed feeling of sorrow and exultation, a stimulating communion of spirit. Of his type, there are, thank God, in our Corps still many doing noble work, and we are grieving, alas, over not a few whose names are alongside his on the Roll of Honour. I like to think of those who, reading what has been set forth, may turn to a dear one dead and say "Why, the name being changed and a few special incidents, all this applies to you." It will be so, for the truly great and noble are all one in spirit, while at the same time to each is given a something peculiarly his own which makes him for those who love him a being complete in himself and distinct from the rest of humanity.

When I was first attracted by Dalton he was sitting, one of a class to whom I (having retired from the Service) was lecturing at St. Vincent's Hospital. My eyes rested on him, wandered over the class, returned, and before I had ended he had so centred my attention that I found myself unconsciously addressing him in a special manner.

The tie so formed was never broken. What a character was his! That buoyant, upright, fearless carriage; those eyes sparkling with joy, humour and strength; deep down, just visible, a subdued, inquiring wistfulness; in answering one, that collecting pause and slight gesture like a golfer addressing his ball. Each friend will add his quota of characteristics, and perhaps all will accept the following lines as expressing their feelings:—

"That cordial hand ; that bearing free,
I see them still, I see them now,
Shall always see—
And what but gentleness untired,
And what but noble feelings warm,
Wherever shown, howe'er attired,
Is grace, is charm."

The manner of his death was as follows : Lieutenant-Colonel Dalton went out on August 18 with the Expeditionary Force, in charge of No. 1 General Hospital. On September 8 he joined the Headquarters, 2nd Division, 1st Army Corps, as A.D.M.S., at a place called Moussey, to the north of the Aisne, replacing Colonel H. Thompson, taken prisoner. As to how he met his death the following is from a statement sent by Major Cummins, who had it from an eye-witness, Major Bostock :—

"Dalton and Bostock went up with G.S. of 2nd Division to Verneuil hot shelled. Teams, etc., knocked about, and nobody but Dalton and Bostock to do the carrying. Dalton did all he could in personally carrying wounded into Verneuil Chateau. In doing this he got hit in the back (shell).¹ As he lay on the ground a stampeding gun limber bruised his left hip. Rescued by Persell of Signals, who just pulled him out in time. Was paralysed by concussion of spine, only pain around chest (girdle), but thought he was dying.

"On admission to the temporary hospital, where he was under the care of Colonel Copeland and Captain Carter, it was found that he was paralysed from the waist downwards. There was a wound between his shoulders, also some small wounds on his head and face. He considered that the paralysis was caused by the shell before the limber passed over him, was not too hopeful of his chances, but was very calm and suffered very little pain.

"He remained two days in the temporary hospital (a chateau) and while there was visited by Father Dey, the Army Chaplain, who administered to him the Last Sacraments. Throughout this time Dalton was cheerful and more anxious as to how others were faring than troubled about himself. He appeared to do fairly well at first, improved as regards sensation and movement and got more hopeful. Spoke of going to Paris in a motor-car and then on home. As the chateau became too dangerous to be continued as a hospital

¹ Other reports state that he was looking about for a site to place a field ambulance when struck. The existence of these different accounts may be explained by his having passed from one duty to another.

(it was under very heavy shell fire), Major P. Davidson decided to evacuate it, and risk a journey down the hill back across the Aisne in the dark to the next temporary hospital at Vieil Arcy. Dalton stood the journey fairly well, and was pleased to leave Verneuil, but was a bit collapsed at the end. Next morning at 6 a.m. it was found he had developed gangrene of the hip (where he had been bruised only), and he became comatose and died September 18.

"He had a peaceful death. Although the injury was so grave the hopes raised by his cheerfulness and great powers of endurance gave an unexpectedness to this early termination.

"He was buried in the Churchyard of Vieil Arcy, near the Braisne, by the Roman Catholic Chaplain, Father Dey, 6th Field Ambulance. There was a big attendance of the R.A.M.C., with shells falling about all the time.

"A small cross with his name and the date of his death was erected over his grave.

"On September 22, 1914, a telegram announced the death of Lieutenant-Colonel C. Dalton, R.A.M.C.

"To Mrs. Dalton, Wyvern, Killiney.

"Deeply regret to inform you that Lieutenant-Colonel C. Dalton, R.A.M.C., has died of wounds. No further details.

"Lord Kitchener expresses his sympathy.

"Secretary,
"War Office."

"September 23, 1914.

"To Mrs. Dalton, Wyvern, Killiney.

"The King and Queen deeply regret the loss you and the Army have sustained by the death of your son in the Service of his country.

"Their Majesties truly sympathize with you in your sorrow.

"Private Secretary,
"Buckingham Palace."

To his family have come since his death communications from persons of every rank of life, beginning with those at the head of affairs, expressing in the strongest and happiest terms the love and admiration still binding them to Dalton. The comfort afforded by these to his family is very great, and they long to find some expression for their gratitude. The question of publishing these references to him has been discussed, and it has been decided not to do so, at least at present. It would be invidious to make selections and extracts, and even if the letters were given *in extenso* there

would be incompleteness owing to the present situation of many of his best friends. It seems enough, therefore, for the present occasion to let it be known to those who have written, that their feeling words have fallen on generous soil. They show most clearly that for his friends Dalton is not dead, whatever the *Gazette* may say.

In the following brief Memoir, the chief incidents of Dalton's career are told as far as possible in his own words, his family having put at the disposal of the compiler letters of his in their possession :—

Charles Dalton was born at Golden Hills, Co. Tipperary, on May 3, 1867. He was second son of John Edward and Katherine Dalton, and grandson of Edward Dalton, of Ballygriffin, Co. Tipperary.

Beginning in this locality an inquiry into how Dalton became the man he was, one is told at once by the old people, as explaining everything, "Ah! it was kind father and kind mother for him," or again, "Ah! it was the ould stock." This stock can be traced back to Anglo-Norman settlers in the beginning of the thirteenth century. Eyes that searched the banks of the Suir as Strongbow's ships, on a full tide, sailed up towards Waterford, are, with an Irish tear in them showing itself as joy, the eyes which in the many adventures of Dalton's life gave cheer and courage to all around him.

Of these settlers it has been said that in intermarrying with the Irish they became "more Irish than the Irish themselves." Anyhow, for very many generations before Charles Dalton saw the light there existed between his forbears and their neighbours, high and low, a sustaining influence that was twice blessed. Of the inhabitants of a very large area round Ballygriffin, as in other parts of Ireland, it might be said in many respects that they were one happy family. Each family properly so called was large, each member of it a cell generating love, and as each centre became surcharged, floods of friendliness spread themselves abroad and intermingling gained further force. They were men who loved the land they lived by, the breath of the soil and its sustaining life were dear unto them, they gloried in it, they fought for it at home, and they sent their sons to fight for it abroad.

Mr. John E. Dalton, the father of Charley, was a man of ability and refinement. He farmed a large extent of land, was a breeder of many good horses, and is remembered as a high-minded man and in every sense of the word a true sportsman. Of his personal

characteristics those who knew Charley need not be told. He was a man of excellent carriage, and noted as one of the best fishermen on the Suir, as a first flight man to hounds, and one whose happiness lay in adding to the general stock of the active, joyful, wholesome life of his neighbourhood. In these surroundings Charley, the offspring of generations of clean living, spent the first twelve years of his life. The explanation of the calm, happy ease with which he did all things is lying before us. He was not a miracle except in so far as all life is such.

In 1879 he was sent to Clongowes Wood College, where he remained four years. His class fellows tell me that he stands out in their memories as a steady worker, as a leading spirit in all games and athletic adventures, and especially as an influence which, considering his age, was almost unique and was altogether good.

In 1883 he began the study of medicine at the Carmichael Medical School, Dublin, and in 1888 took the diplomas of the Royal Colleges of Surgeons and Physicians, Ireland, thus going through the curriculum in the prescribed time without a hitch. As went his years at Clongowes so did these. Good work in class, in hospital, in playground, and in social life. His medical teachers remember him as hard-working, clear-sighted, one who took a firm grasp of his subject and kept a hold on it throughout.

In the Pembroke Rowing Club he helped more than one boat to victory, and as a football player he is still recollected in the Monkstown Football Club, of which he was the Vice-President at the time of his death, and one of its chief stays.

Anxious to see the world he, in November, 1888, took an appointment as Medical Officer on the R.M.S. "Magellan" to Valparaiso, and liking the trip, repeated it the March following, sailing this time in R.M.S. "Cotopaxi."

The following letters and extracts throw interesting light on the chief incident of that journey :—

TO HIS MOTHER.

"Lisbon,

"May 20, 1889.

"We have arrived here in the Company's steamer 'John Elder' with excellent health, but nothing else; our own old ship has gone down where they can never trouble her again. We just had to clear out as we stood at the time to get into the boats, and shove off when the 'Cotopaxi' sank in one hundred and fifty fathoms of water. Of course, you have read in the papers how we were in collision with a German steamer in

the Straits of Magellan, how after many hairbreadth escapes by sea and land, all of which I will relate at some future time, we continued our voyage for Valparaiso, not by the ordinary way, but through a narrow channel, hoping to escape bad weather with a patched ship. We proceeded very nicely for one week, when, at the hour of 2.30 in the afternoon, we struck an unknown rock in mid-channel, and sank in eight minutes; crew and passengers numbered in all two hundred and seven, so that getting the boats out and getting all into them was pretty smart work. Everybody lost everything, and we had four days in Patagonia, living on mussels and some casks of tallow which were the only thing that floated ashore. On the fourth day we were rescued by the German steamer 'Scots,' by which we reached Sandypoint, at which place we waited for the 'John Elder.' We expect to arrive in Liverpool on Monday, May 27. I suppose you will see something in the papers, as reporters met us in Lisbon from all the principal English papers.

"Good-bye, give my love to all, who I hope are quite well.

"The Captain and ship's officers gained great praise for the way they behaved through the whole thing, but I will tell you all about that next week."

The following letter was addressed to the *British Medical Journal*, and signed by all the officers of the ship:—

"Presuming that you have doubtless heard of the total loss of the Royal Mail Steamer 'Cotopaxi,' which occurred on April 15, we beg to send you a few particulars worthy of note and deserving of publicity through the medium of your valuable paper.

"The 'Cotopaxi' was on a voyage from Liverpool to Valparaiso and, whilst proceeding through that part of the Straits of Magellan known as Smythe's Channel, struck on an unknown rock and foundered in eight minutes. There were on board at the time, including men, women and children, two hundred souls, and yet in that brief time of barely eight minutes every soul was saved from a watery grave. We had amongst the passengers two men who were paralysed, one of whom was completely so. Our surgeon, C. Dalton, L.R.C.S.I., forgetting his own personal safety, rushed below and with great difficulty carried from the steerage the poor fellow (who could not move himself) and placed him safely in a boat; he then directed his attention towards the other (a saloon passenger) and succeeded in saving him also. No one saved anything but the clothes they had on at the time, but Dr. Dalton with great presence of mind secured a bed and one set of bedclothes from his own cabin, and gave them to the poor paralysed steerage passenger, which saved this poor fellow's life, for we all lived three days and three nights on the rocks and in the ship's boats amidst snow and heavy rain, before we were rescued by a

70 *A Memoir of the late Lieut.-Col. Charles Dalton*

passing steamer. Many of the people suffered greatly from wet and exposure, but we found food plentiful in mussels and snow water.

"We are, &c.,

J. M. HAYES, Commander.

J. S. TAYLOR, Chief Officer.

J. C. DRUMMOND, Second Officer.

H. E. ANDREWS, Fourth Officer.

THOMAS KIDD, Purser.

A. B. HANDCOCK-MIDDLETON (Passenger, Shankill,
Co. Dublin).

"R.M.S. 'John Elder,' Lisbon, May 20."

Dr. Dalton is the second son of John E. Dalton, Esq., J.P., Ballygriffin, Co. Tipperary, and Alma Terrace, Monkstown. An intimation has been conveyed to him that the Royal Humane Society propose to confer on him their Gold Medal.

"Ambassade de France,

"Londres,

"le 3 février, 1890.

"MONSIEUR,—J'ai l'honneur de vous annoncer que par un décret de M. le Président de la République rendu sur la proposition de M. le Ministre des Affaires Etrangères le 31 août dernier une médaille de 1re classe en argent vous a été décernée pour reconnaître le dévouement dont vous avez fait preuve lors du naufrage du 'Cotopaxi' le 13 avril 1889 en portant secours, au péril de votre vie, à deux paralytiques, dont un de nationalité française.

"Je suis heureux d'avoir été chargé de vous communiquer cette décision de mon Gouvernement et je vous serai reconnaissant de m'accorder réception de la Médaille qui vient de vous être offerte par le Ministère de la Marine que vous trouverez ci-joint ainsi que votre diplôme.

"Agréez, Monsieur, les assurances de ma considération distinguée,

"WADDINGTON.

"À Monsieur Dalton, M.D."

On his return to Dublin after the "Cotopaxi" affair, he was appointed Resident Surgeon to Jervis Street Hospital. In January, 1891, he competed successfully for a Commission in the Royal Army Medical Corps, passed through the ordinary course of training at Netley and Aldershot, and in the following October embarked for India.

He served during 1891-92 at Secunderabad. From Secunderabad Dalton went to Burma, where during 1893-94 he served in the Kachin Hills Expedition, receiving the medal with clasp.

On leaving Burma he was sent to Pindi and while there was ordered to join the North-west Indian Frontier Expedition. His doings are set forth in the two following letters :—

TO HIS MOTHER.

“Camp at Amandarraah,

“August 7, 1897.

“I wrote a scratchy letter to Elizabeth some time about a week ago, when I first got ordered on Field Service. Since then years have really passed, at any rate I feel so. I went to Murree first of all to receive orders. When I got there I was ordered to get back again and join the battery by train, as they had already left their hill station and I could not possibly catch them up by following their road. I met them on Saturday morning, and took over medical charge of them from one of our chaps called Goodwin, who of course was awfully sick at being sent back to make way for me.

“This took place at a little railway station called Hassan Abdul, which we left that evening by troop train for Nowshera, my old station. We got to our railway journey's end at four o'clock in the morning while it was still black night. I was trying to get into my boots and puttees, which were all I had taken off, when a Surgeon-Major named Johnston put his head into the carriage window and said ‘Is Dalton here?’ ‘Yes.’ ‘Well you are to hand over medical charge of the battery at once to So-and-So and you are to come and take over charge of A Section British Field Hospital from me and be ready to march at 7 a.m., behind the Royal West Kent Regiment.’ Of course I was out of the carriage at once, and tumbled out all my kit. The Royal West Kent Regiment was bivouacked on the platform, having just got out of a train from Peshawar an hour before; the men lying on the ground beside their piled arms, hardly room to move; but when the Mountain Battery began detraining mules, guns, and men outside the station matters were still worse; more row, more confusion, of course absolute darkness over all. I got away with my little baggage into a four-wheeler which Johnston had waiting for me very thoughtfully, and off we started to where the boxes, mules, ambulances and doolies of the Field Hospital were drawn up ready to march. Of course I had to take over everything documentarily without going through it, but I knew Johnston was all square, so I did not mind that—next thing was to find my pony which I had sent on a day before. Luckily my knowledge of the place stood me well. Even as it was, knowing all the likely places where to look, it took me a long time to ferret the pony out. Having found her I had only to get my tent at the station and then I was ready to march; of course there was no place to feed. The Nowshera regiments had already left for the front, Johnston was going back to Peshawar to take on the other

sections of the field hospital. He gave me a cup of tea (black); on that I left Nowshera to march to Mardan, sixteen miles. We got along all right for half way. By that time it was 'bloody hot'—excuse the expression, none else would be sufficiently strong—three men became unconscious from heat-apoplexy while the regiment was halted to give the men some food, and when I came up the three cases were handed over to my charge. I spotted a small running stream, and soon had the three of them stripped and lying in it while we just held their noses above water. I began this at 11 a.m., and continued the treatment until 3.30 p.m., when the water had become so hot in the stream; there was no improvement to be hoped for from continuing the treatment, moreover, myself and my staff were nearly as bad as our patients, so we put them into the ambulance and started for Mardan again. I got in at 6.30 p.m. after being on the move since 4 a.m.; a drink at the Guides' Mess revived me somewhat, and then having handed over my three cases to the native hospital, I was off to the camp to see how my hospital was faring, which I had not seen since I stopped behind on the road. This kept me going until dinner time, about 8.30 or 9 p.m., when I got the first meal of the day. Every regiment and battery that came up lost somebody. I worked like the devil the whole time, and the fellows of the regiment are awfully grateful to me and give me full credit for saving the lives of some of their men. We are halting here a few days to settle things a bit, and to get together enough transport troops to march on into the enemy's country. No more at present."

TO HIS FATHER.

"The Malakand,

"September 3, 1897.

"You know how I got out on a show at last, just as I thought that my last chance of seeing any battle fighting in India had passed when they left me out of the Tochi show. However, 'when things are at their worst,' etc., came true once again, and I was the first of my Service to get sent up to these parts when the music began. Of course I was late for the actual defence of the Malakand and Relief of Chakdara, but I accompanied General Bindon Blood's 1st Brigade on a walking tour through the Upper Swat country from where we have just returned now. The native man stood for us one day when we attacked him and gave him a very severe thrashing, and after that he would not stand again, or even show himself until he sent in to say that he surrendered to us unconditionally, and then by order of 'Simla' he was allowed to come back to his villages and crops and our force was ordered to march back out of his country. We had a very hard time of it when we first came up, but things have fallen into their proper places a bit by now, and we manage to pull along all right. I have been here for the past week, and

am kept very busy. All enteric cases which show themselves are sent here to me, where I have been handed over an empty house in the Fort and a nursing sister, and have been told to open a hospital. It is wonderful what one can do when cornered, and out of the empty barrack room and the nursing sister I have turned out a very respectable ward for bad cases; all others I treat in my field hospital which is equipped for twenty-five patients, but where I have been treating between sixty and eighty daily as a routine ever since coming here. The Principal Medical Officer said 'You must manage it, Dalton.' I said, 'It shall be done, sir,' and done it is. My greatest difficulty is to manage to feed my patients, some wanting beef-tea diet, and others who are convalescent being fit to eat their ration in 'the flesh.' However, with a bit of luck I have managed up to now to keep them from starvation, and if any poor fellow is unlucky enough to fall in for a short ration of food, well, we make it up for him in an extra dose of quinine or diarrhœa mixture and it all tots up correctly somehow in the end. Some of the pick of the Native Army are here with us, and they are fine fellows. I never had an opportunity of knowing them on Service before, and I never thought they were as fine as I know them now to be. They march the day out and at the end of it they are laughing and chaffing when our friend Thomas is too done to be able to feed. He is full of buck after a couple of days' halt, but give him a long march and a hot day and he shuts up 'amazin'' as Kipling says. We do not know where or when we will end our show here, or whether we will be sent off towards the Khyber Pass. News of fresh dissatisfaction on the frontier arrives daily, and some of the oldest heads predict that we will have our fill and more of battle fighting before we are finished. They have collected troops up here in the Punjab from all parts of India, and rumour has it that the Amir has to give some very convincing proof of his fingers being clean before they believe at Simla that he has not been putting them into his frontier pie. For the time being the 1st Brigade, to which I belong, is having a rest since our return from Upper Swat, and the 2nd and 3rd Brigades are being moved out on similar tours while we garrison the Malakand and Khar camps. The Upper Swat Valley is a beautiful fertile country between two ranges of high hills. The Swat River flows down the centre of the valley, which it irrigates to the foot of the hills on both sides. The width of the valley varies from five to ten or fifteen miles, and in length it must be seventy miles at least. We had to travel on the very lightest scale while up there, and without tents to shelter us from sun and rain things were not too comfortable. However, we live in comparative luxury now and appreciate the change. We are all very keen to know what they will do with us next, as while the people in this direction seem thoroughly beaten and the fighting all over, in the Khyber direction things look as if they were going to have a bigger show and we would all be sorry to be left out of it. They are not pushing it forward very fast yet, and the hot weather

is trying the troops a good deal, but in about another month I would not be surprised if a lot of troops were sent across the Afridis' border, as they are the people who are making themselves most objectionable."

In November, 1897, Dalton returned from India and was stationed at Belfast, where he remained until the following March, when he left England for Sierra Leone. Shortly after his arrival he took part in the Karene Expedition.

TO HIS BROTHER EDWARD.

"Karene,

"April 4, 1898.

". . . I was sent up to the bush in medical charge of a company of a West Indian nigger regiment. We were carried in boats up a river to a town named Port Lokkoh, which was the base of operations. Port Lokkoh itself had been attacked, but the war boys had been fairly beaten there, and had been driven off in the direction of the Kassi country, which is the territory belonging to Bai Boorch, the Chief. We are fighting on the opposite borders of the country, thirty miles away from Port Lokkoh.

"We had a Police Post, and District Commissioner's station called Karene, from where I am writing now. At daybreak on March 22 the company I had come up with was sent as a convoy to a ration convoy of three hundred carriers, laden with stores to Karene. We had a very trying hot march all through the day, sort of slave-driving job, trying to get along the carriers who when they got tired used to drop their loads on the path if not watched. About 4 p.m. we got to a place, Kabantama, having done twenty miles of the thirty miles of our journey, and there we halted for an hour to rest, and water the men and carriers. The captain of the company would insist on going on, although some of us strongly urged him to halt, and form a laager here for the night. We started at 5 p.m. and got along fairly well until just after nightfall, when we were attacked by the enemy, who held a position on the left of the road from which they were separated by a belt of thick brush scrub about fifteen yards in width, through which the W.I.R. would not or could not attack them. As far as I could gather of what went on in front, the men simply bolted past it for all they were worth when they were fired on, then the three hundred carriers who came behind the main body and in front of the hospital establishment, and myself, instead of bolting, dropped the loads they were carrying and lay down behind the boxes, of course completely blocking the path. When we closed up as near as we could to the block, I and the fellows in charge of the rear-guard consulted as to what we had better do. The firing in front had stopped, as of course the men had cleared off along the road. No one had sent back to us to say what was going on, so we were absolutely ignorant of what was doing.

"Craig Brown decided that he would go up through the line of carriers to the main body and get information from the first officer he met, while I was to take charge of the rear-guard and watch the rear. After a quarter of an hour he returned, reported that the road for a distance of about one hundred yards was blocked with boxes and carriers lying down beside them, beyond these was the black night and apparently an open path, but no sign of the rest of the column, and so far as he could see no enemy. We then arranged that I would go to the leading carriers and with the help of a good stick start them with their loads on the road again, and Brown would stay with his rear-guard and do his best to keep any from lagging behind. I got up to the head of the line of carriers, and began my gentle persuasion with them, but as soon as I had a fellow up he only plunged into the bush on the right of the road and grovelled as near the ground as he could, nor did I notice at the time that they were all lying down on the right side of their loads. I had been about half a minute employed thus and of course roaring very loud, when the whole of the enemy's fire was poured into me. They of course judged where I was in the dark by the plenty bad language I was roaring at the carriers, etc. The blaze of their guns lit up the bush on the left, the noise was absolutely deafening, and God only knows why I was not hit, but somehow I escaped. Then the world's record was beaten for a run back that path over carriers, boxes of stores, rocks, etc., until I reached Craig Brown. Another consultation held, we decided that we would divide the rear-guard, half to remain and act as rear-guard under me, while Brown took the other half up to where I had been fired at, and put a few volleys into the bush.

"After a quarter of an hour watching and waiting, and listening to the devil of an amount of firing, I heard shouts for the doctor. I legged it along for all I was worth with some dressings, and when I got to where I had been potted at before, a chap named Tarbet, a major in the Frontier Police, called out to me from some distance up the road beyond the stockade, and said that Brown had been hit, and was lying on the road in front of the stockade. I asked him to keep his men firing from where they were, so as to take off the enemy's attention from me while I dressed and looked after Brown, who I found had been hit in the left side down low near the last rib. On account of the position of the wound I did not like to pull him about, or carry him away without dressing him, and while that dressing lasted I was in as hot a corner as I have any wish to be ever in again. After that with the help of a stick I got a hammock brought up to where he was lying and I lifted him into it, and whacked the hammock boys along the road in front of me. By the best of luck I got the hammock and myself through a heavy cross fire without anyone being scratched; but the carriers (who, like a flock of sheep, seeing one go in front follow in a rush, had swarmed after me when they saw me push through) were not so lucky, five were killed, and three more mortally

wounded. All the men of the West Indian Regiment remained grovelling on their stomachs as close to the ground as they could keep, afraid to get up. I met Major Tarbet and about twenty of his Frontier Police about twenty yards up the road. They and the rear-guard remained on the ground all night protecting themselves behind some of the boxes which they stacked up to shelter themselves, and by keeping up a hot fire all night prevented the enemy looting all the stores and boxes of ammunition, which the carriers had left on the road. About half a mile further I was challenged by a sentry, and found that the column had laagered for the night in the open.

"After getting in I re-dressed Brown more carefully, found another wounded officer and about four wounded men to be attended to, and we passed about as uncomfortable a night as is possible. The enemy, although they never dared rush us, swarmed in the bush all round and fired into us all night; while our men were so beat by the long march we could not keep them awake, and had to be constantly crawling about rousing them up. We ourselves were in the same way, and it was only by keeping oneself in some very uncomfortable position one could prevent oneself falling asleep in spite of the firing all round. . . . The carriers are a frightful nuisance when a fight occurs, they drop their loads and run for shelter, and nothing can get them to come back until all firing is done. If we have to retire then we cannot get a single man to come back and take up his load, so that often stores have to be left behind and the blighters we are fighting collar them."

TO HIS SISTER.

"Karene,

"April 4, 1898.

"At daybreak we continued our march and reached this place about 12 noon. Two days later I accompanied the same convoy on the return journey to Port Lokkoh. We were again attacked about five miles from here, and after fighting on for two miles further every officer but myself was hit and unable to do anything. As we were over twenty miles from Port Lokkoh, and were hampered by a lot of wounded officers and men who were absolutely funkcd, I decided to retire back to Karene. I got the whole of the convoy back without having to leave anyone behind, and since then have had a busy time of it here. We have to go out every second day with troops along the road to try and clear the bush of stockades and keep the road open.

"Two days after our failure to get through to Port Lokkoh a strong convoy was sent from there to relieve us here and bring us up supplies. We had sent them the news of our difficulties by carrier pigeons, which we brought up from Sierra Leone. This is our daily means of communicating with the outside world. Well, the convoy got through after a very hard time. We helped them by opening up the road for seven

miles from here. They had one officer mortally wounded. One man was killed, and thirteen wounded of the West Indian Regiment, and five carriers wounded. That convoy returned to Port Lokkoh a week ago; we saw them seven miles of the way, going before them and doing all the fighting. We had another officer badly hit through the knee that day, and some five or six other men wounded; these went on with the returning convoy to Port Lokkoh, together with all the wounded I could move from here. Since then I have not been quite so busy, but we have had very trying times and everyone is feeling the strain.

"I must say the kind of fighting we have to do is very funky. The enemy build up huge stonework stockades, most of them about one and a half yards in thickness. Through this thick wall they run bamboo stems, and having got under cover of the stone wall they fire at us through the bamboo tubes. These stockades are built quite close up to the road in the very thickest bush they can find growing, and from the back of the stockades they have a bolt hole, or line of retreat down which they retire when things are getting too hot for them. When we come along the road they wait quietly until we are just passing them, then they blaze at us, and, knowing that they are quite safe inside the stockade, they keep their fire dead on us while we have to cut a path through the bush round to the back, so as to get at them from there. When they hear us approaching they bolt away, generally managing to keep a whole skin, as, owing to the thickness of the bush we never get a view of them. Iron pots broken up into slugs is what they use mostly, but they also have some good rifles and seem to have a fair amount of ammunition. I have never been so funky in my life as I have been at this game, and for many days it seemed only a matter of waiting a little and that your turn would come to get bowled over. I am the only officer left out of the lot I left Port Lokkoh with. But now the worst seems to be over, as they have given up rebuilding the stockades which we have pulled down, and for the past three days that we patrolled the road not a shot has been fired at us. We know nothing here about how this little show is going to end. They thought at the beginning that it would simply be a walk over, but it looks very different now. This man, Bei Boorch, who is fighting us, used to be a pal of the Britishers, and has been with our troops on several expeditions about here against other tribes; in that way he knows a lot about our weak points, and what kind of fighting tells most against us."

"April 8.

"We have had no news since we left that convoy on the road, and returned back here to hold the place. We are just beginning to feel a bit anxious, as our provisions are running a bit short, but we are sure to get supplies before very long.

"To-day is the 8th, we can only live here until the 14th. After

that we must starve or try to cut our way through to Port Lokkoh, unless we are relieved in the meantime. This will most probably happen, as they must know we have only a limited supply of food for the garrison here—if the worst comes to the worst, we will probably be able to get through to Port Lokkoh all right. Our last pigeon is to be sent off the day after to-morrow. If nobody turns up, it will tell them that if not relieved we march from here on the 14th.

"Excuse the scrawl, most of it has been written while I am lying on my back on my bedding, which is spread out on the mud floor of a hut—and a very dirty floor it is, too.

"We will most probably hear what they intend doing with us when the convoy comes up, and I will add another scrap, telling you what they have decided on, whether we are to stay up here for the rainy season, which is just beginning, or to go back to Sierra Leone."

"Saturday, April 9.

"We were relieved to-day, just as we were thinking that after all we might have to make a run for it; everyone's spirits have changed in consequence from almost despair to the very opposite extreme.

"As usual we started to patrol the road. We were up at 3.30 a.m., and started in the moonlight. Had great difficulty in getting the carriers to leave camp; they all dreaded the road, owing to the number that have been hit lately. Yesterday four were very badly hit while out with the Frontier Police. At last, about 5.30, we got clear of the camp; the two beauties who were carrying my medical appliances and dressings bolted into the bush when about a quarter of a mile out, leaving the loads on the road. We got along without meeting any opposition for about seven miles, and were wondering what was the meaning of it when suddenly we saw the head of a convoy coming along the road towards us. This turned out to be a strong relieving force who were on their way to Karene. They had halted last night at a village named Kaghantama, about ten miles from Karene, had left a strong party there to get a position to make a permanent camp where troops will be kept to help us to keep the road open; another such camp has been formed half way between Kaghantama and Port Lokkoh; so with these two permanent camps between Karene and Port Lokkoh we ought never to be cut off again. They returned to Kaghantama, and are to come on here to-morrow with stores, ammunition, etc., and I believe they have some mails for us. The effect on us all was magical. Officers, men, and carriers bucked up like anything when they saw the new companies. Indeed, things were getting a bit bad—the carriers were absolutely funkcd, and could not be got to do any work on the road. The men of the West Indian Regiment had been worked off their legs like all of us, and were about dead sick of being shot at every day by an enemy they never could catch a glimpse of; we were having a lot of sickness, too, and for the last few days had great difficulty

in finding thirty-five men out of the whole company of over one hundred strong who were not either suffering from fever or wounds, or else pretending that they were not well. The night guards were nearly all done by men often with fever on them or else those recovering from wounds. I have never seen things so bad before as they were with us, and everyone was dead down on his luck. To-day everything is changed, and we are all for fighting again.

"The new Colonel who succeeds the poor old boy who died on the way up here has come up with the column that we met on the road to-day. He seems to know more about what he has to do than any of the fellows I have met out here up to now. He told me he heard at Port Lokkoh that Bei Boorch is getting very sick of the show, and his men are tiring of fighting us. And report says that he is wanting to ask for peace. The only peace he is likely to get is four yards of the best hempen rope.

"Maxwell, the Colonial surgeon, went out with the police yesterday and got wounded in the neck: a black devil crept up in the thick bush to within about fifteen yards of where he was standing while the police were knocking down a stockade; the bullet missed his head, just cutting him on the side of the neck and passed on to a carrier boy who was beside Maxwell, hitting him plump on his head. It smashed the skull right in, and when I operated on him when he was brought back to camp here I took large bits of broken skull out of the brain substance into which they were driven to the depth of about two and a half inches. The boy is still alive, but I entertain small hope of his recovery. It was a very near thing for Maxwell. I have been most lucky; I have a perfectly whole skin up to the present time; although I was struck one morning by a spent slug on the point of the shoulder it had not enough force to enter my jacket, and after hitting me fell down on the ground. They say here that I bear a charmed life. I think it must be that you are all praying very hard for me at home. I will send off this letter when the next convoy of wounded leave here for Port Lokkoh, which I hope will be soon, now that a larger force has arrived."

SIERRA LEONE.

Extracts (written from memory) from two reports sent in by Captain Carre-Smith, of the 1st West Indian Regiment, to the Officer Commanding Troops, Karene. The first report was sent in on March 23, 1898, the second on March 25 or 26, 1898.

EXTRACT FROM FIRST REPORT.

"The Column under my command marched from Port Lokkoh at on March 22, 1898, and reached Matiti at dusk, when we were vigorously attacked.

"I wish to specially mention the following officer:—

"... Captain C. Dalton, R.A.M.C., who displayed conspicuous bravery in attending to Lieutenant Craig-Brown, who was dangerously

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wounded under an extremely heavy fire from a stockade a few yards away ; while he was binding up this officer's wounds four or five carriers who were lying close by at the time were killed. It was entirely owing to Captain Dalton's coolness and courage that Lieutenant Craig-Brown is now alive."

EXTRACT FROM SECOND REPORT.

"The Column under my command marched from Karene at on March 25, 1898. Just after leaving Matiti we were fired on from two stockades in the bush, and as Lieutenant C. W. Maclean and I were wounded almost simultaneously I ordered the Column to return to Karene ; when we had gone some five hundred yards it was discovered that Private Barrett had been left behind. Surgeon-Captain Dalton, R.A.M.C., called for volunteers to go back and fetch the man, and as no one would go, he and Company Serjeant-Major McKillop went back and brought the man in."

CERTIFICATE.

"It having been brought to my notice that two reports sent in by me in March, 1898, to the Officer Commanding Troops, Karene, were never forwarded to the proper quarter, I hereby certify that the above extracts, written from memory, convey the idea of what I stated in those reports concerning the gallant conduct of Captain C. Dalton, R.A.M.C.

"(Signed) MEREDITH CARRE-SMITH, Major,

"Tower of London,

"June 28, 1901."

"Late the West Indian Regiment

and 4th Middlesex Regiment.

It is to be noted that the official reports of Captain Dalton's conduct on these two occasions sent in March, 1898, were never forwarded to the proper authorities, who appear to have received no information concerning them till June, 1901, more than three years after the occurrence. Men of experience, with a knowledge of all that happened and of the lie of things on the occasion, assure me that had the matter been gone fully into at the time Dalton would have been awarded a Victoria Cross.

Dalton returned from Sierra Leone, March, 1899. In the August of that year his father died, and it must have been a satisfaction to him that he was at home on that occasion.

Two months later, November, 1899, he was posted to the 14th Hussars, then under orders for South Africa.

TO HIS SISTER.

"R.A.M.C. Mess, Aldershot,

"November 22, 1899.

"I arrived here on Monday to take over my charge, a nice regiment, and good fellows I am told. It was by the merest chance I secured it as another man had been posted for it at first, and owing to his not

being able to ride I think they were obliged to find another medical officer. I happened to turn up just at that moment in the office, and was asked if I could ride. Of course I could, so now I am attached to the 14th Hussars during the whole show, and you will always be able to know whether I have any fun or not by watching the movements of the regiment, and you will know that I am there or thereabouts, if you see that they are in luck.

"The actual day for our embarking is not known yet, but we hope to get away by the first week in December, earlier than that we cannot hope for as the ship cannot be prepared to take horses before that time."

(TO THE SAME.)

"Estcourt,

"January 11, 1900.

". . . Here I am, as fit as a fiddle, and having the very best of good times. Were it not for all the sorrow attached to the whole show nothing could be better. Climate is excellent and everybody feeling the very fittest; we came here straight from the ship. . . .

"A big battle is expected to come off in a few days, and we hope to be there. It is the ambition of the regiment to be the first of our troops to gallop into Ladysmith; it will be rare luck should it come off. I only heard to-day of Captain Bacon's death. He was shot clean through the head gallantly leading his men in the action of December 15 at the Tugela River, when we failed to effect a crossing.

"His regiment behaved awfully well, and gained the admiration of the whole camp.

"It has never been my luck to have served in such a delightful climate or under such pleasant circumstances as we are doing at present. Everything is on the grandest scale and 'Tommy' never had such good times as he is having. . . .

"FRERE, BEYOND ESTCOURT.

"We marched here from Estcourt last Saturday and were only on the war path one day since we arrived. We formed a part of a force sent to reconnoitre the Boer position at the Tugela River, Colenso, same place where Buller was defeated on December 10, 1899, and where Bacon was killed. Our object was to draw the Boers' fire, and to discover the position of their trenches and guns so that we might bombard them with our heavy guns. The result was not altogether satisfactory as we only managed to draw a mild fire from them. Buller is trying to go round more to the south-west of our position—and we are not with him—he is at it hard to-day, and when he succeeds in taking their position by his flank movement, then we will probably act as escort to a big provision convoy which is here ready packed on wagons to forward to the starving wretches in Ladysmith. We will probably go up the direct road via Colenso.

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" . . . The Boers have occupied an extremely strong natural position, and it will cost a lot of lives to turn them out. But it must be done if Ladysmith is to be relieved and that immediately. . . . We can hear Buller's big gun plainly. He is twenty-nine miles from here, and all is ready for conveying a big batch of wounded to the base hospital. The hospital train is ready at the station here to start when the wounded arrive."

MAJOR HACKETT, R.A.M.C., TO MISS DALTON.

"No. 4 General Hospital.

"Mooi River, Natal,

"Friday, January 26, 1900.

"Your brother, Captain Dalton, who was badly wounded on Tuesday last, asks me to write you as he knows you would be anxious to hear about him. I am very sorry to say that his wound is in a most dangerous position, the bullet went into the front of the abdomen and came out in the right flank. But I am very glad to be able to tell you that so far he is doing well, and I hope he will continue to do so. It is a very great matter that no bad symptoms have set in and this being the third day makes us hopeful of his recovery. It will be some consolation to you to know that he was wounded in nobly doing his duty as a good soldier surgeon, attending to a wounded comrade under a heavy fire from the enemy. You will also be glad to hear that we all admire him and think he is a fine brave fellow, that we, his brother officers of the Medical Corps, as well as you his own people may well be proud of. His reputation before this had always been very high; now it is still higher, and we all fervently hope he will live to reap the reward of his self sacrifice and devotion to duty. I heard he obtained special permission to go and attend the wounded in a very dangerous place, and was shot from a very short distance. He would not leave his wounded comrades. I am sorry to say he was out all night after, and had a very hard time of it, but he is now very brave and does not complain of anything and is much more hopeful than he was. He is a great friend of my brother's family at Kilmallock, and you may be sure we will be very kind to him.

"P.S.—He is very comfortable now and well looked after.—C. H."

MAJOR E. O'BRIEN, 14TH HUSSARS, TO MISS DALTON.

"Cape Frere,

"South African Field,

"January 27, 1900.

"You will doubtless have been informed before this of your poor brother having been wounded on the 23rd inst. He came to the regiment about five weeks ago just before we left England, and in that time he endeared himself to us by his fine gentlemanly feeling and soldierly qualities. I am a man with a family, and have seen a good deal of the

world, but have never met a man I took a greater fancy to; I mention this to show how much he was appreciated by us all. The wound is certainly a serious one, but I hope he may quickly recover. The news yesterday was that he was doing well. I was in command of the portion of the regiment that went out on the 23rd, and he was therefore under me. He was throughout up to the time he left me the same cheery good officer he always is. A man galloped up, and asked for a medical officer as an officer was badly wounded. Your brother immediately volunteered to go, and he rode off in the direction of very heavy firing; this is the last I saw of him. I learn that he reached the dying officer and attended him, when another man was hit, and in stooping down he was hit in the stomach. I thought all was well with him, as he was wearing the Red Cross, till I reached camp about 10.30 p.m. He appears to have had a dreadful night of it, poor fellow. He is now at Mooi River Hospital, where he is receiving every attention.

"You will be glad to hear General Barton told him when he saw him wounded and brought in that he had heard of his gallantry and intended to bring it to notice. I feel very much for you, as I myself feel I have lost, I hope only temporarily, a dear friend. If there is anything more I can tell you, I hope you will not hesitate to let me know.

"January 29, 1900. The news is he is much better.

"With sincere sympathy, and may God grant his return to you safe and sound."

"Spearrans Camp,

"February 4, 1900.

"I have just time to send you a line to say your brother is much better.

"We are on the eve of a big battle.

"E. O'B."

TO HIS SISTER.

"Mooi River Hospital,

"February 2, 1900.

"Thanks very much for your kind letter which I received yesterday. I am glad to be able to tell you that I am making a most marvellous recovery from what at first seemed a mortal wound. I was hit through the abdomen on the evening of the 23rd ult., just as we were retiring and the Boers following us up. They fired on me as I was kneeling dressing a wounded man, and hit a third man at the same time. Our own people, who were busy covering their own retreat, knew nothing about us, and there we remained lying on the ground all through the night. That was a terrible night. The two wounded men with me were dying the whole night—wounded through the stomach, just as I was. They, however, would drink water which the Boers offered us when they came up, and they would not lie perfectly still as I advised them to do. It was a most

heartrending thing to be obliged to look at all through the night, and of course I could render them no assistance.

"At 5 a.m. in the morning after lying on my back for twelve hours I managed to pull myself along to a native kraal to send a native for assistance. The kraal was deserted, and I had to pull myself along until I met our advanced pickets before meeting anybody who would bring assistance. I remained lying down until a doctor and ambulance arrived, and when he had attended to me and given me a hypodermic of morphia I directed him to where the other poor fellows could be found. One was found dead, the other died before he reached the camp in the ambulance. For twenty-four hours I thought I had no possible chance of recovery, but after that when no bad symptoms began to appear, I began to hope of pulling through; since then my recovery has been uninterrupted, and I hope to be back again at work in a fortnight.

"The Mauser bullet used by the Boers is a most gentlemanly bullet. The hole it makes is so small that if you remain perfectly quiet for some hours after being hit through almost any part of the body you have a very good chance of pulling through. I attribute my recovery to having lain perfectly quiet for twelve hours after I was hit, and I was further lucky in not having had any food for about ten hours before. There have been most marvellous cases of recovery from wounds in almost every part of the body. I want for nothing. The care and attention I have received is beyond any words of mine to express; nurses and doctors have done everything possible to add to my comfort.

"I am now taking solid food again in small quantities; the first few days was, of course, absolute starvation."

TO HIS MOTHER.

"Bloemfontein,

"April 30, 1900.

"I had not time to write to anyone last mail, as I was away on a week's trip out to the East where we had some fighting. I saw none of the sport, however, and had only some operation work to do. I get on very well in my new job, and am very pleased with it. It is a grand opportunity for seeing every big operation done by the very best of surgeons—Watson Cheyne, of King's College, London—we pull along together very well, and I anticipate a very pleasant time on our march to Pretoria, which begins to-morrow. The hardships will be nothing like as hard to bear as if I were with a regiment, as we have our own transport and can carry sufficient blankets to keep us warm. The weather is dry and fine, but the nights are beginning to be exceedingly cold; heavy dews, but healthy so long as one can keep warm. How long we will be on the tramp it is impossible to tell, but even granting that we meet with comparatively little obstruction it will take us a good two months to do the 300 miles

from here to the Transvaal capital. I am feeling exceedingly fit, and enjoyed my week's tramp last week very much; we only arrived back yesterday and leave to-morrow morning. I received a letter forwarded from the Commander-in-Chief, Lord Wolseley, to General Buller, stating that he was much pleased to hear of my gallant conduct at the Tugela affair—what the conduct was I hardly know, but he desired that I should be informed of how he approved of it. We leave to-morrow to march to a place called 'Karree,' where we have had a division holding a position ever since we marched into Bloemfontein. All the troops will rendezvous there for the general advance, which we expect will begin on Sunday next. There has been a dreadful amount of sickness here, principally enteric fever. There are over 1,100 cases under treatment at present out of a total of some 1,500 sick. We have had great difficulties to contend with in the way of getting our sick transferred down to the base, as all available rolling stock was required to bring up food-stuffs and ammunition to carry us on during our long march. Owing to this reason the sick have been accumulating here at a frightful rate, and it is most depressing to see about twelve or twenty funerals every afternoon. We hope that the health of the troops will improve once we begin to march."

TO HIS SISTER.

"Scotch Hospital, Norvals Pont,

"June 10, 1900.

" . . . I have only got as far as the above address as yet on my way home in disgrace as useless. I came down here in a hospital train, which did us very comfortably, and made the journey very easy. Unfortunately I went back a bit here at first, which has delayed my being sent down to Cape Town, but I hope to be sufficiently well to be considered fit to travel some day this coming week. . . . Ever since I left hospital at the Mooi River I have been nothing but the veriest crock, and have hardly done an honest day's work, and now they all seem to consider that I am useless until I am given a rest. However, as things seem to have come to a sudden ending (as far as the war is concerned) I am not now so dissatisfied at the prospect of going home to England. The rotten thing about my present trouble is that although I am useless for work on account of going wrong inside I am perfectly fit and sound constitutionally and have my ordinary most excellent appetite, but cannot satisfy it. I wish this order of things would change quickly, and I am sure it will after this long rest I am having now. What played Old Harry with me was the marching which I had to continue after the last attack began. In previous attacks I was able to lie up at once when the trouble started, but here I had to continue on the trek until we got to Kroonstad, and I feel certain that that was the cause of my convalescence being so much delayed this time."

" Claremont Convalescent Home,
" Cape Town,
" June 19, 1900.

" By the address above you see where I have got to; I feel exactly like the healthiest of the patients I used to look at at Linden—you know the kind, as healthy-looking as possible, loafing about the grounds trying his best to appear to be a sufferer and only making a very bad attempt at that. . . ."

Soon after this he left for home, on March 16, 1901. The Arnott Gold Medal for distinguished gallantry in the field was conferred on him by the Irish Medical School and Graduate Association, this being the first award made.

During 1901 Dalton was stationed at Hounslow Barracks, and in 1902 he went to Sierra Leone a second time. After a year's service he returned, and the Curragh Camp knew him till 1905, when he left for another tour of service in India, Pindi being his station. The letters at hand covering this period are numerous and illuminating. In them written in an intimate way you see the man somewhat as if you were living with him in a tent. It, however, has not been found possible, even by the most cruel use of the blue pencil, to bring them within limits proper for the present publication. The experiment was tried and the cripple remaining did not correspond to the full-sized free-moving man whom we remember with special and ever-changing energy in each part of him. They cover his life at Pindi—short visits to hill stations—two periods of strenuous solitary life in Cashmere in pursuit of game, snipe and duck shooting in Scinde on the Manchar Lakes, a period of work amongst the plague-stricken natives of Pindi, a voyage to South Africa in charge of troops, 9th Lancers, when he met his brother Edward, who was settled in Natal; five months in Ireland, during which he had much hunting, people vieing with one another in giving him mounts, and again rending the air with "Go it, Charley," as he cleared the last fence at Fairyhouse on a winning mount. Finally, eight months at Aden, where, in November, 1909, he concluded this tour of foreign service.

The following telegram tells of an honour conferred on him during this period:—

" Major C. Dalton, R.A.M.C.

" Dated May 22, 1908.

" R. Pindi.

" 175 T. Viceroy is pleased to select you for distinguished service in the Field for appointment of honorary surgeon to His Excellency.

" Military Secretary, Viceroy."

The letters written during this varied tour are necessarily interesting, owing to the scenes and incidents they describe. But while a loved personality is fresh in one's memory, one can think only of his behaviour as he passed through them. There is frequent mention of interesting medical and surgical cases, and one cannot help sharing in the joy he feels in the skilful practice of his profession when he gets to work on his own responsibility. One goes back to his early experience—for instance, to that letter to his father written during the North-West Indian Frontier Expedition on the Malakand, in which is plain the delight he felt in watching the men undergoing recovery whom he had (as they were suffering from sunstroke) put "lying in a running stream while we just held their noses above water," and from this start one can follow him as he goes with ever accumulating experience and force to further work. What an eventful entrancing life! As he goes through it, one is struck with this—that whether things are great or small, he does them with equal ease, naturally, and as a matter of course. Owing to his spiritual condition, they are all for him on one level. He was not of those whom great occasions make look bigger than they really are, and in whom it is plain that they feel so themselves.

The word distinguished never occurs in connection with Dalton, for this simple reason, that he so loved his fellow men, that what he wanted was not solitary glory but to be with them, and of them; to be carried upwards by the attraction of their hearts, and to exercise a like influence over them. This state of feeling, like the sweet scent of a flower, pervades the whole correspondence, and, moreover, was for those who knew him in daily converse one of his marked characteristics. Another fact made clear in these letters is, what a sustaining force a love of home was for him. In his letters to his mother and sisters, he is clearly just the fully developed boy whom we have seen leaving Ballygriffin at 12 years old for a public school, and they are for him the same who on that occasion pressed him in their arms.

"Happy he with such a mother! Faith in womankind
Beats with his blood, and trust in all things high
Comes easy to him, and tho' he trip and fall,
He shall not blind his soul with clay."

His habit of self-repression when occasion demanded, is yet another and not the least charming feature of his correspondence. He knows that even truth may be economical in the service of love, and consequently the most anxious heart can accompany him

joyfully through all situations. Any of us who have served at Aden know that it is not the one place on earth for a man given to sport, and for whom bodily exercise was a necessity, still so cunningly does he suppress what is tiresome and give roseate hues to the good points that we might be tempted to have another try of the place if occasion offered. Again, if we turn to his account to his mother of the "Cotopaxi" affair all is as calm, as far as he is concerned, as was the sea around him, but once in an unguarded moment he lets in a side light which illuminates this incident. It was to his eldest brother Edward, who was one with him in early days and remained so to the end. With him he spent some hours when revisiting Natal on trooping duty with the 9th Lancers. Over pipes in talking of the adventure Charley remarked: "When I was coming up the companion ladder with the second paralysed patient the water was pouring down on us with great force. Having to carry him I had of course only one hand with which to drag us both up against it. By George! Edward, I thought it was all over. At each hand's turn it looked as if we both must be washed down by this flood before I could regain another hold."

THE TOUR OF HOME SERVICE PRECEDING HIS DEPARTURE FOR THE SEAT OF THE PRESENT WAR.

During this time, with the exception of absences at camps of exercise and instruction, he filled the position of D.A.D.M.S. Irish Command. What he was through these years to the many old friends he met here and to the social, sporting and military life of Dublin it is unnecessary to say. The name "Charley Dalton" opens up so many bright scenes that special reference to them is out of the question. He played many parts with a charm that was peculiarly his own.

Sport.—Under this heading a man of like type, and one intimately acquainted with him in most of his doings in the field, has given me the following notes:—

"Charles Dalton was about as fine a type of sportsman as it would be possible to get in this or any other age, a man who liked to be and went to great trouble always to keep himself fit, sticking to extreme moderation in food and liquor, and taking an extraordinary amount of exercise. One day, overtaking Charley in St. Stephen's Green, I asked him if he was going to Leopardstown Races. On his answering 'Yes,' I said, 'All right, let us take this

outside.' 'Outside be hanged!' 'How then are you going?' 'Going to walk,' and off we went on one of the most enjoyable walks I ever had. Charley moved so easily and was always so fit, that he envied not those who passed us in motors."

Most of his love of sport came to him from his father. Charley, being one of a large family, had as a young man to content himself with amusements less expensive than those classified as sport, i.e., with cricket, football, tennis, and rowing.

When away in India and on the West Coast he did a lot of shooting, and his residence was covered with trophies; but it was his hunting and racing career which showed the real grit of the man. Like many men in the Royal Army Medical Corps he could not afford either of these amusements when a young man, and although occasionally getting a mount, and willing to ride anything that came along, he was well on the wrong side of thirty before he found himself the possessor of a couple of horses—one of these named Caloola he brought up from the country in a horse truck himself, trained and rode him during the winter practically on his own, and had the satisfaction of being second in the military race at Fairyhouse, the Corps being, as the saying is "on to a man."

His last horse was the well-known Grand National horse Thowl-Pin; as brave as a lion, and as gentle as a lamb, would aptly describe him; trained by kindness and not by brute force, he was an extraordinary docile animal, and at the same time an extremely good one. Thowl-Pin fell once at Fairyhouse, but won everything else he went in for, including several point-to-point races—the Army heavy-weight race, the Military race at Fairyhouse, and finished by winning the Blue Riband of Irish Military Racing, the Grand Military at Punchestown, horse and owner being accorded a great ovation.

Charley was terribly fond of the sport, he worked at it so hard and so persistently that at the time of his death he would have very few superiors as a rider amongst military men, and certainly no one else who started so late would be likely to attain his proficiency.

As a horseman he had very little faith either in spur or sticks, and doing most of the training of his own horses, no one ever saw him in trouble with them.

In a sporting country, he got, and was offered plenty of mounts, and for the sake of a ride did not cavil very much if on some occasions their capabilities were rather below par.

Tennis in the summer and squash rackets in winter, at either of which he was fit to win tournaments, kept him very fit, and on the

bike, "the poor man's friend" as he called it, he pedalled many a weary inch of the Ashbourne road in order to get a day's hunting or go for a "school" before breakfast on some embryo chaser.

Charley Dalton we believe was the first member of the Royal Army Medical Corps to win a Military Steeplechase in Ireland, and he added to the already high sporting status of the corps when he cantered away with the Irish Grand Military on Thowl-Pin. Thowl-Pin was a horse trained by himself. He was sold before the outbreak of the war, and is at present amongst the favourites for this year's Liverpool Grand National.

In conclusion, it was extraordinary the amount he did in a sporting way on his moderate means, and when one takes into consideration the way in which he met with open heart and hand the many calls upon him, calls personal and remote, the words "a true sportsman," with all they mean in the part of Ireland from which he came, take on a new and fuller meaning.

The following letters indicate Dalton's movements and doings from the outbreak of the war:—

TO HIS SISTER.

"15 Acres,
"Phoenix Park, Dublin,
"August 9, 1914.

"... Here I am, busy mobilizing No. 1 General Hospital on the ground on which I have so often ridden old Thowl-Pin when exercising.

"It hardly seems credible that we are preparing for the big war, about which we have been talking so long that it seemed to have become a thing that was never going to be a reality.

"My billet is commanding one of our base hospitals, and although I expect to have plenty to do, I will be doing it under more comfortable surroundings than I have ever worked on service before. . . ."

TO HIS MOTHER.

"No. 1 General Hospital,
"British Expeditionary Force.

"... The above is my address, and our orders are not to give any more information as to our positions. We are at present preparing to see patients, but have none up to date; when we get settled we will be very comfortable and can live quite in a civilized way, so you have no need to worry on that head. . . . We hear no war news except what we read in the English papers, and these only get to us very late.

"Even here we never know where anyone goes to. They disappear into a train and they do not themselves know their destination until after they have started. I have to read every letter of my unit before it is stamped with my Censor stamp—so that none of the men can let their families know of their whereabouts.

"Yours, etc."

Found in His Writing Case Returned from the Front.

TO MRS. FRANK DALTON.

"Head-quarters 2nd Division,

"British Expeditionary Force,

"September 13, 1914.

". . . I have lost my nice comfortable billet of a General Hospital, and, as you probably heard, have joined the Field Army. I have been sent up to do A.D.M.S. of a Division in place of Colonel Thompson of my corps, who is amongst the missing."

(Before going out he confided to a friend that an assurance had been given him that what he called "his comfortable billet" would not hold him long.)

"We are having a very strenuous time, but we are beating the Germans, and nobody worries much about anything else. They are on the run now and we are following up. Large batches of German prisoners and wounded are now coming almost daily into our hands, and they all seem thoroughly tired and sick of fighting. We are off every morning in the dark, and get into our billets after dark. The shortening days are handicapping us considerably, and of course this is an increasing evil as the winter comes on. The Head-quarters Staff of the Division always have a roof over their heads, which is a lot to be thankful for, and our billets vary in a wonderful way. One night we will be in a farm building, next night in a very fine chateau, and again another night we may be in some public building in a town. The Germans have generally only left twelve hours before we arrive, so the beds we have to-night were slept in by Germans last night.

"All the nice places are deserted by their owners, and only a caretaker left, and it is quite sad to see the whole of the wardrobes, drawers and other lock-ups burst open and the contents scattered all about the rooms. As a rule I must say there is no wanton destruction of property noticeable, but everything that is of any use is taken, including the food and wine; always the wine, in fact they never leave a bottle, and the French inhabitants tell us they are always drunk every night.

"I, of course, have had no letters or papers for a very long time now, as they all go to No. 1 General Hospital first—poor old No. 1 and I had become great friends, and I was very sorry to part from a

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real good lot of men. They gave me a great send-off when I was leaving them, and my departure was very sudden.

"We have had excellent weather on the whole but occasionally we get a good washing out, it is about the only washing we do get.

"I have not had a bath since I joined the 2nd Division and do not see any prospect in the near future. We have to be after the Germans very quickly if we want to get a good bag of them, and when you get up at 4 a.m. or earlier and"

This is all we know of Dalton under his own hand ; the remainder has been told in the opening pages. There remains a few points to be referred to under such headings as :—

PROFESSIONAL WORK.

His life was so eventful that we have to guard ourselves from loving him, as in Othello's case, "solely for the dangers he had gone through." There was much besides.

Firstly his handicap in professional efficiency as adjudicated by the War Office was "scratch" and those who served under him used to say, that it should be plus 3. His letters team with instances of the interest he took in matters medical, surgical, and military and show him in unremitting efforts to make up his work. In one he says, "A senior to me has arrived, thank God ! I can now spend evenings at home making up lea-way—as long as I was the only senior man I felt bound to dine with the young fellows constantly at mess." Examinations and camps of instruction are invariably referred to as incentives to, and opportunities for making up work. The present writer recalls a day when he dropped in upon him in his office at the Castle about 3 p.m. After a reference to how hard Thowl-Pin had pulled at "a school" that morning, the conversation turned upon the army medical work as shown by statistics referring to his last tour in India. He told me, as he might describe a fox hunt, of the personal efforts made by each individual medical officer to bring down the death-rate and that of invaliding ; of letters of the surgeon-general urging them each year to try and break each previous record ; of how they had hunted up "typhoid carriers" and tried not to give one single trick away to the arch enemy, etc., etc. Then on my referring to the state of things, as shown by statistics, during my first tour of service in India he looked up those of 1866 and those in the last blue book, with the following result :—

Year	1866	1912
Death-rate per 1,000	19.03	4.62
Invaliding ..	48.79	6.68
Average daily sick ..	58.42	28.86

What a splendid record of life-giving efforts equal to more than destruction (as applied to us) has been able to accomplish in the present war.

Surely! brother officers ours is a "noble profession," and worthy the devotion of a life.

RELIGION AND HOME LIFE.

These necessarily go together, for his home bound him to his religion and his religion to his home. As has already been said, he was one of a large family. For him religion and home meant everything, the oftener the reader goes on repeating "meant everything" the nearer he will be getting to Charley. He was a Catholic, sincere but not austere, who adhered to the end to the practices of his religion. A soldier when questioned as to his religion, not seldom answers "I hold the religion my mother taught me." It is not on record that Dalton ever made such a statement, but intimate friends of his hold the opinion that he found his religion, as taught to him by her, so satisfying that there was nothing urging him to these transcendental inquiries, which, for many, as Keats says, "Spoils the singing of the Nightingale."

This concludes, for space is necessarily limited, the doings of as simple, as adventurous, as noble and as open-handed a soldier and sportsman as Ireland ever produced. It has already been said that he had a harmonious strength, an equal ease in doing all things, an intuition of order, rightness and the essentials of matters spiritual and temporal. These made the God-head that quickened in him; perhaps with equal accuracy you might call it duty, you might call it love, all the virtues are one, since God is one. When the life was knocked out of him, strength yielded temporarily to violence, I say temporarily, for violence is not of God. Lucky are we who knew him. As soldiers it is our duty when we turn "right about" in the grave yard to go our way rejoicing; but on that account we, perhaps more than others, keep a corner in our hearts where we

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“let love clasp grief” lest both be drowned, there we shall treasure him—he in return making alive for us these words of George Eliot’s :—

“O may I join the Choir invisible
Of those immortal dead who live again
In minds made better by their presence live
In pulses stirred to generosity,
In deeds of daring rectitude, in scorn
For miserable aims that end with self.
In thoughts sublime, that pierce the night like stars
And with their mild persistence urge man’s search
To vaster issues

This is life to come.

Which martyred men have made more glorious,
For us to strive to follow, may I reach
That purest Heaven, be to other souls
The cup of strength in some great agony,
Enkindle generous ardour, feed pure love,
Beget the smiles that have no cruelty—
Be the sweet perfume of a good diffused
And in diffusion ever more intense
So shall I join the Choir invisible
Whose music makes the gladness of the world.”



Translation.

PROTECTION AGAINST COLD. PRACTICAL ADVICE REGARDING PROTECTION OF SOLDIERS IN A WINTER CAMPAIGN.

BY MONSIEUR J. B. CHARCOT.

Médecin de Marine de 1^e Classe de Réserve.

THE following suggestions, which I consider it my duty to offer as regards protection against cold, are the result of the personal experience gained in the course of two Antarctic Expeditions covering the winter season, four Antarctic cruises during the fine season, winters spent in mountainous country, two periods of manœuvres in the Chasseurs alpins and numerous inquiries, before as well as after my expeditions, from my colleagues of foreign nations who are Polar explorers.

I do not wish for a moment to pretend that the Winter Campaign of 1914 exposes our troops to cold as severe and of the same character as that which Polar explorers have to bear. Nor do I pretend that the same means of protection should necessarily be adopted under quite different conditions. Nevertheless, I have thought that it might be useful to offer a few suggestions which may not only be the means of preserving men for the national defence, but also to spare those who are fighting for the Fatherland unnecessary suffering.

The idea of writing this pamphlet came to me when I recently saw in the Military Hospitals at Cherbourg, amongst the wounded from the Front in Belgium, men suffering from frost-bite in the feet which would end, unfortunately for many of them, in the loss of these limbs.

As I have already said, I do not pretend that some of the advice which I venture to give can always be applied, but anyone in possession of this knowledge will be able to put it into practice whenever opportunity offers.

GENERAL PROTECTION AGAINST COLD.

Garments put on one over the other, even if made of light material, are much more efficacious than thick ones. Two cotton pants are better than only one woollen pant, two cotton shirts are much warmer than one flannel shirt. I have myself been able to bear the severest cold by wearing under my trousers two thin cotton pants one over the other. People who feel the cold should certainly be satisfied with a cotton pant and a woollen pant, even not a very thick one. The outside garment should be of very closely woven material. The superposition of garments, especially jerseys, gives a feeling of constraint and compression where the limbs join the body. The greatest care

must be taken to avoid this, as much to ensure freedom of movement as to avoid the evil effects caused by cold aggravated by defective circulation. If the jerseys are worn over other clothing the sleeves should be of light material. The under garments should be loose; the outside garment, on the other hand, should be made to fit fairly closely to the body. An overcoat of airproof material of closely woven cloth (tanned if possible) provides most effective protection against the cold. I have myself been able to bear the severest cold that we experienced (40° below zero) when wearing a flannel shirt, a sailor's jersey of closely knitted wool, a waistcoat, a molleton jacket, and over all a small blue cotton mechanic's jacket. The latter might, in the case of the soldier, be replaced by the short jacket which is worn under the greatcoat. In Polar expeditions a garment of tanned cloth or "anorak" with holes only for the arms and head (the latter covered with a hood), and trousers without fly of the same material are worn over the other garments.

This light and practical combination, which admits of free movement, enables one to dispense with furs. The outside garments should be fastened at the wrists with straps, at the legs with gaiters, straps, or puttees, at the neck with a handkerchief, and at the waist with a belt; but these fastenings must never be so tight as to interfere with the circulation.

I must here try to remove a totally erroneous idea which is firmly fixed in the minds of the majority of people. I mean the belief that in going out of a warm place into the cold, not only is the latter felt much more, but the individual is exposed to grave risk. I maintain that it is exactly the opposite to what happens. If congestion of the lungs, etc., have followed in similar conditions, the reason is that the people who were attacked by such an illness had it already on them; similar cases are not to be apprehended in the case of healthy and normal men such as our soldiers should (at least in theory) be. Far from increasing sensitiveness to cold, going from a high temperature to a low one enables one to bear the change much better, even so far as to ignore it for a considerable period of time.

It has frequently happened to us in the course of our expeditions that, in order to take the readings of instruments standing in the open in a temperature of 40° below zero, we have had to go out of dwellings heated up to a temperature of 68° F., without anything on except a shirt and pants, and to stay more than half an hour exposed to the air without noticing the low temperature, whilst, on the other hand, we shivered if, for any reason or other, we had to carry out the same work after leaving a dwelling which was insufficiently heated. All sportsmen know that a douche or cold bath, painful as it may be when one is cold, has no bad effect when one is perspiring freely. The Russians in the severe winter of their country make their houses very hot. I even go so far as to say that this comfortable feeling of stored

heat is felt for a very long time. No one who has been in Polar regions, especially in the Antarctic, where it is cold even in summer, has failed to notice that men, far from getting used to the cold, suffer less from it during the first year than in following years.

I should not be at all surprised to hear that our African soldiers, who escape the evil effects of the excessive wet and fevers, find during the coming winter that they have remarkable powers of bearing the cold. In the retreat from Russia a hundred years ago, Baron Larrey, an unquestionable authority, noticed the same thing among soldiers coming from Southern countries.

From the above we may conclude that whenever possible our men should not be afraid of taking in a store of heat from places where the temperature has been purposely and abnormally raised, and in any case should avail themselves of every opportunity to benefit from the heat. Warm drinks, tea, coffee, soup are excellent preventives against the cold, and all Polar explorers who have made forced marches have experienced after drinking some hot soup that delicious sensation which makes them say that they can "feel it trickling down as far as their toes." Alcohol, especially rum, must be considered a first-class medicine, but it should be taken as a medicine only, for too frequent use of it, even in small quantities, makes it very quickly lose all its efficacy. Whenever possible a half pint of hot wine with a little sugar in it, in which slices of bread can be dipped, will restore a man after he has become a miserable wreck owing to the cold.

PROTECTION OF THE FACE.

Speaking generally, it is considered that frost-bite on exposed parts of the body is to be feared only when the temperature of the air falls 40° below zero. This danger, however, may arise, especially when men are tired, when the temperature is higher and even when the wind is light. Leaving aside the danger of frost-bite, the pain from the cold on the uncovered parts is so great that measures must be taken to guard against it. The well-known and popular Balaclava cap is an effective and practical covering for the head, although some leading explorers object to it, maintaining with reason that it prevents a man hearing and makes him sleep. Some people, too, cannot bear it, and get headaches from wearing it, or a feeling of constriction, which is perhaps more painful than the cold. I advise such people simply to cut out of a muffler or a piece of very thick flannel two large ear pieces and sew them on to the brim of their cap, fastening them firmly over the ears by strings tied under the chin. In most cases this arrangement will prove a very good one and answer well. In low temperatures wind blowing on the face becomes a torture and a danger. The only really effective way of protecting oneself against it is to cut out of a bit of cardboard—or, even better, stiff leather—a piece which can be used as a screen, fixed either to the Balaclava cap or the ear-piece, or on the

windward side between the head-cover and the head. Some people with a very sensitive mucous membrane have, whenever there is the least lowering of temperature, a painful and uncomfortable running at the nose. A little strip of woollen material or flannel fixed on the nose and kept in place by bringing the two ends under the Balaclava cap, or by tying the strings behind the head, will generally obviate this discomfort. In very low temperatures, especially when there is a light wind, there is a danger that frost-bite which has been neglected may become very serious. Some people are especially predisposed to frost-bite, others, on the other hand, seem to be refractory to it. The latter people, however, are not altogether proof, and may be caught when they least expect it. When a part of the face begins to freeze no pain is at first felt, and the patient consequently does not notice what is happening. When the actual temperature makes you fear the danger of frost-bite each man should keep an eye on his neighbour's face. Frost-bite makes its appearance in the shape of an ivory white spot. It is, as I have said, painless, and when it appears the first painful sensation of cold will often have completely disappeared. The nostrils especially, the cheeks, the beardless chin, the ears, where exposed, are the parts generally affected. As soon as the ivory shade appears, the man's companion, or he himself on being warned by his neighbour, should rub it vigorously until it disappears and sensation comes back, which will follow very quickly if this precaution is taken in time. Rubbing with snow is often recommended. This answers very well when the snow has fallen in flakes, but if it is powdery or crystallized by reason of the low temperature such friction may result in painful excoriations of the skin which will become harmful if repeated. It is better to use the hand, with or without a glove, provided in the latter case that the wool is not too rough. The part of the face which has been frost-bitten is liable to freeze again. Knowledge of this fact may be turned to good account, for a man can take the precaution, from time to time, during the night to rub that part of his face which he knows from experience to be liable to frost-bite during the day. It is extremely dangerous in very cold weather to cover the face with fatty substances. They freeze at a temperature which is relatively not very low and thus encourage frost-bite, and may, moreover, prevent recognition of the tell-tale white spot. Petrol, which only freezes when the temperature is 70° C. below zero, and which I recommend on the authority of Dr. Couteaud, Director of the Medical Services, may be tried with good results, but I have no personal experience of it. Certain explorers recommend smearing the face with a black smoke composition which is easily obtained with a piece of burnt cork. This method is effective, but should only be employed when it is impossible to have one's face watched by a comrade, for in this case also the white tell-tale spot may be difficult to make out. In frosty weather, every time that a piece of metal touches the skin in the open air burns are caused. The people

who wear eye-glasses or spectacles ought, therefore, to take the precaution of covering the parts of the metal which are in contact with the skin with pieces of wool or thread. The best treatment of frost-bite which is no worse than a burn of the first or second degree, is a lotion of picric acid.

PROTECTION OF THE HANDS.

Protection of the hands, as well as of the feet, against cold is of such obvious importance that there is no need to dwell on the subject. Not only must steps be taken to combat the pain caused by low temperatures and the numbness which may render the hands momentarily powerless, but we must also guard against the serious risk of frost-bite in one or more fingers which might in a very short time seriously threaten the partial or total loss of the extremity affected, and might end in the spontaneous or surgical amputation of the whole hand. Ordinary gloves of thick woollen material or fur-lined give effective protection against ordinary cold, provided that the fingers and hands are free to move inside them. In severe cold, however, gloves are not only useless but are even dangerous, and should be replaced by mittens. The latter are comfortable, they minimize the risk of frost-bite and enable the wearer to bear the lowest temperatures.

The chief object to be borne in mind, both as regards hands and feet, is the free circulation of the blood. Gloves with even very large finger-stalls predispose the wearer to frost-bite. Mittens, on the other hand, allow the fingers free movement and enable them to utilize the warmth of the rest of the hand and admit of free circulation. In an ordinary mitten the thumb-stall is separate; frost-bite of the thumb, the circulation of which is better assured than that of the other fingers, is very rare. The thumb, moreover, can be easily warmed every now and then by slipping it into the same bag as the fingers. The main objection to mittens is their clumsiness; this, however, can easily be overcome by habit. To be convinced of this one has only to see what our merchant sailors, and particularly our fishermen, manage to do without taking their mittens off. Ordinary mittens, however, are without doubt not convenient for handling a gun, but this difficulty can easily be solved by adding a separate finger-stall for the forefinger, while making the mitten large enough to enable the forefinger to fit into it whenever it is stiffened with cold or when its individual freedom of movement is not required. Mittens can easily be made by anybody, by the soldier himself, just as I have often seen sailors making them, and as I have made them myself, viz., by cutting out of a piece of felt or soft woollen cloth or even, better still, out of an old blanket, two large patterns of the hand which can be sewn together at the edges. One need not be afraid of cutting them too large, for the more room the fingers have to move about in the more heat they will acquire. In my new pattern mitten two openings should be left where the thumb joins

the forefinger, and at these openings separate finger stalls can be sewn, the stalls being cut pretty large out of a piece of wool or flannel, or made of tightly knitted wool by a friendly female hand. I am sure that all the movements demanded by a shooter are absolutely easy whether with the right hand, which has to take the cartridge clip between the thumb and the forefinger and insert it in the gun and then press the trigger with the forefinger, or with the left hand. I am convinced that when wearing such mittens men will not only not suffer from cold hands, but that frost-bite in the fingers will be very exceptional. I am absolutely opposed to the practice of wearing several pairs of gloves one over the other, and also to wearing a pair of light or thick gloves inside mittens. I could mention numerous cases arising from this practice. It will perhaps be sufficient to recall the fact that the Duke of the Abruzzi had, during his famous expedition to the North Pole, to leave his party and lose two fingers because he wore gloves inside his mittens, whereas his comrades, who only wore mittens, returned safe and sound. All the same, there may be some advantage in wearing knitted mittens with finger-stalls inside the bag-like mittens, for if a man is constantly obliged to take off the latter to carry out some delicate piece of work the palm and the back of the hand will retain their warmth and communicate it to the fingers. Felt mittens are softer than woollen ones, and have the advantage that they retain the heat even when they are wet. Our fishermen even dip them in salt water so as to shrink the material.

Frost-bite of the face makes its appearance, as I have said before, in the shape of a more or less extensive spot. When the fingers are frost-bitten generally the whole joint is at first attacked all round and looks like an ivory finger; the painful sensation of cold has then entirely disappeared. The disease is an insidious one and, if not too late, rapid action must be taken to save the finger from gangrene. The finger must be vigorously rubbed with snow or, failing that, with the glove of the other hand. This friction, which should be vigorously maintained, should alternate with the warming of the finger by putting it under the armpit or in the mouth, or by striking it violently with the loose extended arm against the other shoulder, as cabdrivers do. After this has been kept up for some time, and when a sharp and almost unbearable pain in the finger is felt the cure is ensured. The ensuing treatment of frost-bitten limbs which are not saved on the spot by the above-mentioned procedure is a doctor's, or perhaps a surgeon's, business. Picric acid or embalming is an optional method of treatment if the gangrene is limited, which generally happens when there has been no infection through contact of clothes, etc. With the sores, which are not long in appearing, amputation is often spontaneous, and commences with an eliminatory cut. Otherwise it would be necessary to amputate in good time in order to save as much as possible of the diseased limb. These remarks apply as much to the lower limbs as

to the upper ones. On no account must a limb or part of a frost-bitten limb be exposed to the heat of a fire or be dipped into hot water, as most painful and serious complications may result.

I ought to say something about chilblains, which are often so frequent, painful, and extensive that they put the patient quite out of action. I only know of one really effective treatment, and that is rubbing with alcohol and the frequent and cautious application of picric acid. May I be allowed to recall the fact that on no account should the picric acid be mixed with alcohol or glycerine, otherwise an explosive mixture will be formed. Finally, I would also call attention to the fact that, though it does not seem of much importance, the yellow stain on the skin caused by picric acid easily comes off by using a solution of boracic acid.

PROTECTION OF THE FEET.

In the case of the feet, besides the pain caused by low temperature, frost-bite is to be feared. This fact is proved by the great number of sick in our hospitals after the operations in the month of November alone in Belgium, who have most of them lost part or the whole of one or of both feet. The first cause in these cases always arises from an indifferent circulation of blood in the lower extremities. I am able to assert that the great majority of these cases might have been avoided with better knowledge of the conditions in which they occur.

The footgear generally adopted in France is unfortunately ill-adapted for cold weather. Healthy people who go on mountain or country excursions, starting hale and hearty, feel assured that at the end of their trip, in which there have been no prolonged halts, that they will have a good fire, in front of which they will be able to take off their boots and put them to dry. Quite different are these conditions from those in which our weary fighters are often obliged to stand still for a long time and to remain many days without taking off their boots. The latter conditions are similar to those in which Polar explorers find themselves, and the experiences of one of them may be useful. I do not propose to discuss the different sorts of footgear issued in various expeditions, as they would be of no use to our Armies, and time, moreover, does not admit of any great innovations. Suffice it to say that a Polar explorer can never have his boots too large. I have said above that the French army boots are ill-adapted for cold weather; indeed, the upper leather which covers the toes and the metatarsus, is flat, and does not admit of free movement of the toes, or of the wearing of several pairs of socks. The Norwegian boot, on the contrary, has its upper leather shaped like an exaggerated arch, is ridiculous in appearance, but is most practical. When with such boots several large pairs of socks, sometimes only two, are worn (a light one next the foot itself, the other of thick wool like a bed sock

over the first) galls very rarely occur, and even if frost-bite is not totally prevented, at any rate the chief risk of it is avoided; but we have to take the French boots as they actually are. Men, if possible, should wear boots two sizes larger than their usual size and as many pairs of socks as possible. If they can they should add a sole made of cork, straw, or paper. Pieces of straw cut finely, well flattened, and spread over the inside sole will have a good effect, but the most important consideration is freedom of movement for the toes, and nowhere are the feet to be squeezed. Some inquiries amongst the wounded have proved too late that men suffering from frost-bite wore too tightly fitting boots. It is better to wear only one pair of socks—I would even say no socks at all—rather than hinder circulation and free movement of the toes. I speak from experience gained at my own expense during my first long and painful expedition in Polar regions. The man who suffers from and is afraid of cold, and who piles up socks over socks in too tightly fitting boots, aggravates instead of improves his case by squeezing more and more his unfortunate foot, which is in such wise fatally doomed to the terrible frost-bite.

Attention must be paid to the general circulation of the lower limbs. Putties, that wonderful invention, or gaiters, or more particularly bootlaces, must not be too tight. The use of fatty substances for the feet must be rejected. Ordinary leather is a bad material for withstanding the cold, but under the present circumstances it is impossible to do without it. When long immobility is anticipated, as, for instance, in the trenches, the boots can be wrapped up in pieces of cloth or even in putties. The "Chasseurs alpins" possess for winter use some wonderful socks made of cloth with a leather sole which they wear over their boots. I wore them to my entire satisfaction on my last expedition. The more fatigued, the more anæmic, badly nourished, physiologically wretched a man is the more predisposed is he to frost-bite in the feet. The feet should as often as possible be washed in cold water and rubbed. The boots should be dried, softened, and well kept. At a temperature of 10° or 15° below zero ordinary leather freezes, and boots when taken off become hard and brittle as pottery; they should then if possible be warmed in front of a fire or softened with petroleum. In severe cold greasing boots is useless, but does no harm; in damp cold it is advisable.

Frost-bite of the feet, like that of the other extremities, is an insidious complaint; it is just when there is no sensation in the feet that the danger of frost-bite is to be feared. The boots must be taken off quickly, the foot must be exposed and rubbed vigorously for some time. The affected limb should be warmed by putting it under the arm-pit of a comrade, between his thighs, on his chest, or even, if possible, on his bare skin, it should then be rubbed again. I shall not speak again on the consequences of frost-bite of the feet, or on its treatment, or I should only repeat what I have said when

speaking of frost-bite of the hands, but I repeat that the frozen limb must not be exposed to the fire.

SLEEPING IN SEVERE COLD.

During expeditions in Polar regions we use bags made of reindeer skins with the hair on the inside, these bags being themselves contained in another bag made of closely woven cloth. With such bedding in which you bury yourself, the head itself being covered up, you can bear the severest cold even when in a tent. These bags, though light, are cumbersome, and though other skins could be used in less severe cold, I do not see how our soldiers could adopt them in the course of this campaign. A good sleeping bag (I used one in my last expedition) can be made out of ordinary woollen blankets and covered over with another bag made of canvas cloth. It might be advantageous to sew a number of blankets together so as to make only one bag to hold two or more men, who would thus impart their heat to one another. Whether a sleeping bag is available or not (as is more frequently the case) I recommend the following plan, which is well known to many soldiers, and which I myself put into practice for the first time, when I had the honour twenty-six years ago to serve in the 23rd "Chasseurs alpins" under the command of Lieutenant-Colonel, now General Pau. When we had taken off our boots we used to put our feet into the sleeve of one or sometimes of two vests or jerseys, the ends of which we tied up with a piece of string, or even better still, with bootlaces, which prevented our losing our boots. I was able in this manner then and later to spend good nights in comparatively cold weather without any other blankets than the regulation number and the greatcoat which was then worn by the "Alpins."

For some people the advice that I have ventured to give will seem commonplace or even in the nature of a truism. Nevertheless, I know from talking to our wounded, to our soldiers, sailors, comrades, and even to our leaders that many know nothing about the subject, and it is at their wish that I have decided to put the above into writing.

Review.

DEFENSIVE FERMENTS OF THE ANIMAL ORGANISM. Emil Abderhalden.
English translation, by J. O. Gavronsky and W. F. Lanchester.
London: John Bale, Sons and Danielsson, Ltd. 1914. Pp. xx and 242. Third Edition. Price 7s. 6d.

In this little book 146 pages, out of a total of 214, are given up to what might be called a philosophical consideration of the factors underlying the Abderhalden reaction, while the remainder of it deals with the methods used in the application of the test. This philosophical portion makes most interesting reading and has many lessons for the student of immunity. Again and again we get the impression that the author is discussing processes already familiar to us under new names. When we read of the efforts of the body to convert disharmonious substances to harmonious ones, we unconsciously illustrate the process for ourselves by recalling opsonization and phagocytosis or the destruction of bacteria by specific antibody and complement. No doubt there are easily demonstrable differences between these thermostable substances and the specific "ferments" with which Abderhalden is concerned, but it is often illuminating to lay stress on points of similarity rather than of difference and thus connect together instead of dissociating the wonderful processes by which the animal body struggles to maintain itself in its environment. To quote our author "Just as in a workshop in the production of an article, one machine prepares the material for another, and one workman transfers to another material which is finished up to a certain degree, so do the tissue cells mutually support each other in their task."

Abderhalden and his co-workers have opened up a new field and have already gleaned results that promise to throw light on many hitherto unknown areas in the domain of physiology and pathology. The practical portion of the book is exceedingly clear and concise. No summary of it is required, as readers of this Journal are already in possession of an admirable précis of the subject by Colonel Birt (*JOURNAL OF THE ROYAL ARMY MEDICAL CORPS*, vol. xxii, No. 5, May, 1914, p. 499), but it is well to reiterate the warning of Abderhalden himself that the application of the reaction is difficult and delicate, offering many opportunities for technical error and fallacious deduction, and requiring controls at every step. The various pitfalls that await explorers in this direction are admirably set out in the volume under review. It is still a question whether they entirely explain the failure of more than one competent worker to confirm some of Abderhalden's results.

S. L. C.

Current Literature.

Some Observations on the Excretion of Typhoid Bacilli by Carriers (Chronic) [*Beobachtungen über die Ausscheidung der Typhusbacillen durch Bacillenträger (Dauerausscheider)*].—Dr. Albert Hirschbruch has published in the *Berl. klin. Wochenschr.*, No. 25, 1914, some interesting observations which he has made on the excretion of typhoid bacilli by chronic carriers.

The first series of his observations was to determine the *modus operandi* of periodical carriers. This meant frequent examinations. In four cases he conducted a daily examination of both urine and fæces during several weeks. In these cases he did not find a lengthy positive period followed by a lengthy negative one. As a rule typhoid bacilli were only occasionally found, sometimes several days running, but on the whole the positive days appeared quite irregularly in the long series of negative days. The oftener the result of the examination is negative, the more difficult will it be to pronounce the case as being no longer a carrier.

The writer quotes two cases of irregular carriers, both women. (1) V. Her excreta were examined daily for several weeks. She gave a negative reaction fifty-two times before she gave another positive. She died a few days after the positive finding. Typhoid bacilli were found in the body.

(2) M. Her excreta were examined once a month for several years. A positive finding was made on March 1, 1910, after a long negative phase; on this occasion typhoid bacilli were demonstrated in both urine and fæces. The subsequent monthly examinations were negative on forty-nine occasions. She again gave a positive reaction on January 8, 1914. The interval was therefore over three years and ten months.

A second series of observations was directed towards determining the number of typhoid bacilli excreted by regular carriers.

Of the examples, he quotes one case which excreted 32·4 million bacilli per gramme of fæces, and another which on three different examinations was shown to excrete 39 million, 239·6 million, and 259·5 million typhoid bacilli per gramme of fæces.

Where lengthy negative intervals exist, it is useful to know what drugs will produce a positive phase.

(a) One case experimented on showed positive results after almost any purgative; the effects of different drugs, however, vary. Oil of sesame alone did not cause excretion of typhoid bacilli, but the addition of $\frac{1}{2}$ drop of croton oil to the oil of sesame had the desired effect. A few typhoid colonies developed on a Drigalski plate. A repetition on the following day gave the same result. The following day no more typhoid bacilli were found in the stools.

A tablespoonful of castor oil brought typhoid bacilli out in large quantities every time it was used.

During intervals between purgation this patient never showed any bacilli in the excreta.

(b) Further experiments on two inmates of a lunatic asylum with Karlsbad salts, croton oil, castor oil, aloes with podophyllum, etc., proved that periodical carriers cannot always be made to excrete bacilli by administering purgatives.

(c) Of seven other periodical carriers (all inmates of a lunatic asylum) only one was made to excrete typhoid bacilli by the administration of castor oil; but four of them reacted to aloes and podophyllum, which was administered in pill form in the morning.

On the other hand, in active or regular carriers the excretion of typhoid bacilli in the stools can be arrested for a time by the administration of drugs, the most effective so far discovered being calomel with tannoform. In the case of a woman reported on who was excreting up to 227·5 million typhoid bacilli per gramme of fæces, calomel was administered in the form of a powder three times a day for two days. After the fifth powder no typhoid bacilli could be demonstrated either on Drigalski or with the aid of a malachite agar. The examination of this stool revealed only 2 million bacteria per gramme, whereas on the morning before the experiment the stool contained 350 million bacteria, eight per cent. of which were typhoid bacilli. This experiment was performed four times at short intervals on the same individual; on the first two occasions typhoid bacilli had disappeared after the third dose of calomel.

The writer suggests that a stock mixture of calomel-tannoform should be kept in laboratories for workers who may inadvertently suck typhoid bacilli into their mouths through pipettes.

He repeats that aloes and podophyllum will not always cause the excretion of typhoid bacilli, but they sometimes do so when castor oil fails. One must not think that a periodical carrier who has loose stools need necessarily be excreting typhoid bacilli; the first case, V., mentioned in the paper, which gave fifty-two consecutive negative reactions, had loose motions throughout, and gave a positive result only after the administration of castor oil.

Those cases which reacted to aloes and podophyllin excreted typhoid bacilli, some by the fæces, others by the urine; the explanation for the latter cases being that aloes also produces a hyperæmia of the kidneys.

A further point observed was that the first stool after a dose of aloes and podophyllin did not always contain typhoid bacilli; therefore, it is suggested that a sample of all the stools passed for some days after the purgative had been administered should be examined.

The writer is of opinion that before pronouncing any convalescent case bacteriologically cured a final test with aloes and podophyllin

should be carried out. This drug should, of course, not be administered if there is still any risk of harming the intestine.

J. V. F.

Culture Medium for the Tubercle Bacillus.—S. R. Douglas (*Lancet*, October 14, 1914, p. 892) allows a mixture of one pound of pulped uncooked potatoes with one litre of water to stand at room temperature for twelve or twenty-four hours. The fluid is next strained through muslin and autoclaved at 115° C. Acetic acid is added to the hot liquid until faint acidity is produced. After filtration the fluid is rendered slightly alkaline to litmus, and 0.25 per cent glucose, 5 per cent glycerine, and 200 c.c. per litre of a 2 per cent slightly alkaline solution of plasmon are added. Clearing by boiling with white of egg, tubing and sterilizing by steaming for thirty minutes on three successive days complete the process. The growth of the tubercle bacillus on agar prepared with this potato-plasmon extract is abundant and adheres but slightly to the surface.

C. B.

Substitute for Witte's Peptone.—S. R. Douglas has overcome the difficulty arising from the present deficiency in the supply of Witte's peptone in this manner (*Lancet*, October 14, 1914, p. 891). A minced bullock's heart is heated to 70° or 80° C. in four litres of water rendered faintly alkaline to litmus. After cooling to 45° C., digestion is carried out at 37° C. for two or three hours by means of the addition of one per cent of Allen and Hanbury's liquor trypsin. The fluid is then faintly acidified with acetic acid and is boiled. After straining through muslin this broth is made slightly alkaline to litmus, and after the addition of 0.0125 per cent calcium chloride and 0.25 per cent sodium chloride, is autoclaved at 115° C. for one hour to precipitate the phosphates, filtered, tubed, and sterilized. For agar jelly the powdered agar should be mixed with the broth before precipitating the phosphates. The growth of bacteria is more luxuriant than in media prepared with peptone in the usual manner. The cost is less.

C. B.

A Case of Frost-bite and its Treatment (A. Kuhlmann, *Journ. Minnesota State Med. Assoc.*, Minneap., 1909, xxix, p. 359).—"Male, aged 28. Had been drinking; fell asleep on the road; was picked up unconscious. Was rubbed with snow; regained consciousness. Legs were frozen hard half-way up to the knees, hands above wrists. Legs much swollen. Temperature 102° F.; pulse 103.

"*Treatment.*—Blebs opened, sloughing skin and tissue removed; irrigation with a warm bichloride solution 1:5000. Frozen surface was powdered with zinc stearate and bandaged loosely. The upper part of the reddened swollen legs was treated with a weak warm bichloride application to produce hyperæmia and draw out the inflammation. A tablespoonful of mag. sulph. was given to favour elimination, and

$\frac{1}{2}$ gr. of morphine was administered hypodermically to relieve pain. Warm applications on the legs were kept up all night. Next day so much sloughing that I worked from 9 a.m. to 1 p.m. removing the sloughing nails and dead tissue. Next morning swelling had subsided and circulation became more apparent. Temperature 100° F.; pulse 80. Was dressed twice a day for two weeks. In the morning, after cleaning and irrigating with boric acid solution, the frozen surface was dusted with zinc stearate powder. I put a loose veil of sterile gauze around the elevated and suspended extremities for two reasons: to relieve pressure and to give access to air. At night, after cleaning and irrigating, the extremities were well covered with sterile gauze surrounded with sterile cotton and loosely bandaged. The open treatment, with the surface well powdered with zinc stearate, proved by far the best. There was not much sloughing and pus formation, but a crusting drying process. To my surprise I found that every day some apparently dead, lost parts would resume circulation and repair. After four weeks' treatment seven fingers and seven toes were partly amputated, all else was preserved."

The following information on Swiss Red Cross Work for 1912 has been extracted from the "Revue Militaire Suisse" for April, 1914.—The Central Society of the Swiss Red Cross at the end of 1912 comprised 33,719 members and 311 associations. Directly affiliated to the Central Society at home, there are 179 members and 61 abroad. There are 948 associations in the country and 38 abroad.

Central funds for the same period amounted to 284,577 francs. This represents an increase of 44,309 francs on the previous year, due chiefly to the sale of cards in 1912. The total funds of the sections at the end of 1912 were 434,193 francs, an increase of 11,546 francs.

The Red Cross in 1913 collected 168,213 francs in aid of the victims of the Balkan War.

The number of Red Cross columns is twelve. They are at Aaran, Bâle, Berne, Bienne, Glaris, Herisau, Horgen, Lucerne, Schaffhausen, St. Gall, Winterthur, and Zurich.

The report by the Central Society mentions notable progress in the training of the personnel allotted to territorial medical establishments. The Central Society has succeeded in raising the twenty-four Red Cross detachments required by the new Army Medical Regulations. Each detachment consists of forty well-instructed professional female nurses, with a senior sister in charge. This is considered a sufficient staff for nursing about 500 cases.

The territorial medical service in time of war thus disposes of 960 infirmières, who will look after 10,000 beds at least.

The nine following establishments supply Red Cross detachments:—

- (1) The schweiz Pflegerinnenschule of Zurich: 4 detachments = 160 sisters.
- (2) The Schwesternhaus of the Red Cross of Fluntern-Zurich: 1 detachment = 40 sisters.
- (3) The Diakonissenhaus of Neumünster-Zurich: 2 detachments = 80 sisters.
- (4) The Institute of Ingelbohl: 5 detachments = 200 sisters.
- (5) The Diakonissenhaus of Riehen: 2 detachments = 80 sisters.
- (6) The Rot-Kreuz Pflegerinnenschule of Berne: 2 detachments = 80 sisters.
- (7) The Diakonissenhaus of Berne: 2 detachments = 80 sisters.
- (8) La Source Evangelical School of Nurses at Lausanne: 5 detachments = 200 sisters.
- (9) St. Loup, Institute of Diakonesses: 1 detachment = 40 sisters.

The Swiss League of Samaritans included at the end of 1912 263 detachments, comprising 11,368 members, viz.: 6,904 men and 4,374 women. A small number of societies are attached directly to the Central Red Cross Society. Help has been rendered 19,290 times, and the transport has been used 1,041 times. Funds: 2,754 francs. The Swiss League of Samaritans received a subsidy of 800 francs from the Confederation in 1912, the Central Red Cross Society gave them 1,400 francs, to which should be added 11,587 francs for equipment of various kinds.

The Société sanitaire militaire suisse comprises all medico-military societies in Switzerland. On January 1, 1913, it had twenty-six sections and 738 active members. During the year it organized 404 conferences and exercises.

J. V. F.

Disinfection of Apartments occupied by Tubercular Patients (Wohnungdesinfektion bei Tuberkulose).—Karl Laubenheimer, in the *Zeitschr. für Hyg. und Infektionskrankh.*, Bd. lxxvii, 1914, deals with this controversial question, and describes how he set about putting to the test the various methods prescribed by law in Prussia, Würtemberg, and Baden. To obtain conditions resembling reality he spread tubercular sputum first on smooth deal boards, then on wood painted with oil colours. These were allowed to dry at room temperature in diffuse daylight, twenty-four to forty-eight hours being usually sufficient time to allow. The pieces of wood were then kept in the dark until required for the tests. After the application of the disinfectant the sputum was removed from the boards; a sample of each was injected into two guinea-pigs subcutaneously, one being killed after an interval of four weeks, the other after six weeks. In this way the officially prescribed disinfectants were tested, the 5 per cent cresol soap solution, the 0.1 per cent sublimate solution, and the formaldehyde gas; further experiments were made with a 0.5 per cent sublimate solution recommended by Flügge, also with a 0.3 per cent sublimate solution, and lastly experiments with new disinfectants, phobrol (a

mixture of chlor-m-cresol and rizineolsauren kali) and grotan (another chlor-cresol preparation). *

The writer came to the following conclusions:—

(1) Neither formaldehyde, nor the 0·1 per cent sublimate, nor the five per cent cresol soap solutions succeed for certain in killing tubercle bacilli in thick dried sputum even after nine hours' application.

(2) The best results were obtained from formaldehyde, especially when the sputum had dried on something which was impervious to water.

(3) The 0·1 per cent sublimate and the five per cent cresol soap were useless.

(4) A mixture of formaldehyde gas with solutions of 0·1 per cent sublimate or five per cent cresol soap gave unsatisfactory results. A mixture of formaldehyde with phobrol seems to be satisfactory.

(5) Certain destruction of tubercle bacilli in thick dried sputum could only be obtained with a 0·5 per cent sublimate solution and a two per cent phobrol solution, but only when the solution was allowed to act for at least five hours.

As phobrol is not poisonous and is suitable for general employment (it does not attack metal), Laubenheimer recommends it in a two per cent solution as a disinfectant in tubercle. A one per cent solution is sufficient for other infectious diseases.

J. V. F.

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Journal
of the
Royal Army Medical Corps.

Original Communications.

SOME OLD BENGAL RECORDS.

BY COLONEL R. H. FIRTH.

FROM time to time one has contributed to this Journal details from the Madras records; recently one has had an opportunity of examining some old Bengal papers, and as they furnish interesting items concerning old-time medical affairs in that Presidency, one is tempted to put them forward for the use of others.

The first paper was a petition from a Mr. Anderson, dated Chunar, July 9, 1785, in which he asks that he may be permitted to resign his commission as ensign in the 1st Regiment of Europeans, to which he was appointed on June 4, 1781, and be appointed to the physical line, as he was a regular bred surgeon and had practised for thirteen years. The noting shows that the request was granted. Attached was a letter from Lieutenant Stanton, of the 4th Sepoy Battalion, to Mr. Hamilton, the senior surgeon at Fattyghur, showing that a general order had been issued that gentlemen serving in both the military and medical lines were desired to relinquish one or other of them. On this account, Stanton offered himself as a regimental mate to the 8th Battalion of Sepoys, then vacant, and because he had been bred a surgeon. The request was granted. On the same file was found a long letter from a Dr. Francis Balfour to the Hon. John Macpherson, Esq., Governor-General, and to the members of the Supreme Council. It is dated Patna, August 27, 1786, and may be quoted almost in full. "Hon'ble Sir and Sirs,—The remonstrance of Mr. Monro, Mr. Ferguson and

Mr. Boyd, against my rank to which I am desired by your Hon. Board to reply seems to contain four objections or arrangements which I shall consider separately. However, I cannot help expressing my surprise that a remonstrance addressed in July, 1784, to the Hon. Warren Hastings, Esq., should be for the first time transmitted to me for a reply in August, 1786, when Mr. Hastings is no longer Governor-General and Mr. Ferguson one of the gentlemen who signs the remonstrance has been more than a twelvemonth dead. . . . When I arrived in Bengal and until within these few years I have already observed that it was customary in the Service for an assistant surgeon to hold likewise a subaltern's commission in the Army, and he was allowed to retain both until he arrived at the rank of either a full surgeon or of a captain, at which time he was obliged to relinquish his other appointment and to attach himself to that line only in which he had received his promotion. Mr. Cranstown enjoyed both for some years and held them at the time of his death, and if I am not mistaken, Captain Frederick Breton held both until he was promoted to the rank of captain, at which time he lost his appointment of assistant surgeon. There are other examples which I do not remember exactly. I held both appointments until I returned from Madras in 1778. I was then promoted and became a full surgeon and dropped of course my commission in the Army. On a former occasion, I took the liberty of laying before your Honourable Board certificates of three different commissions from the Company, the originals of which are in my possession. By the first, I was appointed an assistant surgeon in November, 1768, by the Honourable Court of Directors; by the second, my rank on this establishment was fixed and confirmed in July, 1769, by the Hon. Harry Verrelst, Esq., and Council; and by the third I was promoted to the rank of full surgeon in August, 1777, by the Supreme Council. Mr. Hay, the Secretary to the Government, wrote to the Board that it appeared on a reference to a return of the 2nd Brigade dated December, 1785, that Lieutenant Francis Balfour stood on the strength of the Brigade as a lieutenant and not as a surgeon. By a general order of December 15, 1769, Mr. F. Balfour was appointed an ensign by the Governor-General, and later on advanced to the rank of lieutenant and, as such, by a minute in Council of 1776 he was permitted to remain twelve months with the Nawab of Arcot. In 1778 he was permitted to retain his proper rank in the list of surgeons according to his original warrant of assistant surgeon, dated at Fort William on

July 2, 1769, and a warrant as full surgeon was granted him from August 16, 1777." The foregoing is an important letter, throwing much light on the customs of that time. The noting shows that the name of Lieutenant Francis Balfour was ordered to be struck off the list of the Army. In 1786 he became surgeon in charge of the Chunar Hospital and subsequently obtained a seat on the Medical Board.

Some interesting details are available concerning the earlier administration of the medical service in Bengal. A Military Board was established in April, 1786, "for the purpose of directing the necessary regulations and arrangements" for all the hospitals at the Presidency. The original Board consisted of James Ellis, the Physician-general and director of hospitals; Andrew Williams, the chief surgeon; and John Fleming as surgeon of the headquarter hospital. A Mr. Birch was appointed purveyor, and a Mr. Edmund Bengough as apothecary. Later, Thomas Gillies was made secretary. The following extracts are made from the first regulations respecting military hospitals, and were issued by the Board on June 6, 1786.

"Having thought fit to reform the medical departments in India, and to place our military hospitals on a regular system, by which their annual expenses may be reduced and accurately ascertained, the sick and wounded properly attended to, and the gross abuses checked of receiving into the hospitals men with trivial complaints, to the great loss and prejudice of the public service, the following rules and orders are henceforth to be established at the different Presidencies."

"With a view to give every degree of encouragement to men of professional abilities and integrity to prosecute the medical line in our service in India, we hereby direct that at Bengal and Madras there shall be a physician-general, as director of the hospitals, with a salary of £2,500 per annum, and the head surgeon of every hospital where 8,000 men may be stationed, in peace or war, shall have a salary of £1,500 per annum, and the head surgeons of all the other general hospitals are to receive each £1,000 per annum. All surgeons to regiments shall have the pay and emoluments of a captain of infantry upon our establishment; all hospital mates the pay and emoluments of a lieutenant of infantry, and all regimental mates the pay, &c., of ensigns of infantry upon our establishment." Though the emoluments are quoted in sterling, actual payment was in sonat rupees; the rate being eight sonat rupees to the pound sterling. It is curious to be able to record, as far

back as these times, a difference in treatment as to money between the civil and military. The civil people were paid in sicca rupees and the military in sonat rupees; the difference between them lay in the fact that four hundred sonat rupees were only worth three hundred and eighty-two sicca rupees; however, by order of the Court of Directors, eight of either kind was reckoned as equivalent to a pound sterling.

“When a vacancy of surgeon at the head of any of the hospitals shall take place, the Board will recommend to the Governor and Council for the succession the most deserving regimental surgeon and the most deserving hospital mate to succeed the regimental surgeon, and the most deserving regimental mate to succeed the hospital mate. But although the most ample encouragement is hereby given to merit, yet it must be understood that seniority and equal merits are to have the first claims to promotion. As the head surgeons are responsible for the officers under their command they are to have the power to suspend such inferior officers who may disobey their orders or prove negligent and inattentive, reporting the same to the Board. The head surgeon is to assign the several parts of duty to the inferior officers, to direct that the sick shall be conveniently lodged in wholesome wards having a free circulation of air, that they be kept clean and not crowded in the apartments, and are regularly subsisted agreeably to the diet tables, established for that purpose. He is empowered to dismiss nurses and servants for neglect and ill qualification; he is also responsible that the sick soldiers have clean cots and clothing, and that no one takes rewards from them.”

“Medicines are to be supplied only on the order of the surgeon, who will keep an account of issues in a journal. All admissions of sick into hospital are to be recorded setting forth their diseases and date of admission and discharge; weekly returns of sick are to be sent by surgeons of regiments to the head surgeons of the general hospital of districts, and these officers will send monthly returns of the sick so reported to the Board, together with requisitions for any medicines they may require. The oldest hospital mate at each hospital is to have charge of the medicines, but issuing them only on the authority of the head surgeon. All contracts for provisions are to be approved by the Board and not to be above market rates. Boards of survey on damaged drugs will be held every quarter and invoices submitted to replace.”

The following extract from instructions for the purveyor of a hospital, dated June 9, 1786, runs “the common drinks in full

and middle diet are to be water, toast and water, or barley water, with one spoonful of good Batavia arrack to each pint of water, or two ounces of Madeira wine to a pint of water. For a low or milk diet, barley water with or without Madeira or red wine." An extensive correspondence at this time testifies as to the expensiveness of wine in the treatment of the sick. One finds the garrison surgeon of Fort William estimating for 1786 that the issue of two glasses per man per diem amounted to Rs. 900 for four months. Under regulations issued in 1787, only Madeira was to be used, and that not in excess of six dozen for twenty men. The rates quoted show that a dozen bottles of Madeira cost Rs. 13 at Berhampur, Rs. 14 at Dinapur, Rs. 16 at Chunar, Rs. 18 at Caunpur, and Rs. 20 at Fattyghur. It was ordered that no spirits be given internally. Many of the documents of this time are about the excessive consumption of spirituous liquors by the soldiery, and it is only too obvious that the curse of intemperance was the most pressing question of the day. Venereal disease comes also in for a fair share of official notice. In Berhampur, out of a European garrison of 413 there were no less than 163 in hospital with venereal disease in April, 1787, and 172 in May of the same year. We see clearly from these facts what were the curses of the Army at the end of the eighteenth century in India, and how great is the improvement in this respect in modern times.

Not the least interesting feature of the documents under review is the evident desire of the authorities for the hygienic welfare of the men, both in barracks and hospital. It is true the orders are vague from our point of view, but the ideas are sound. One finds repeated orders as to the need to guard against the soldier being robbed when in hospital, and the need for him to be seen every day by the officer of the guard as well as by the surgeon to safeguard his being properly fed. It is only too evident that the ways of our Aryan brother were well understood in those times, and that the temptation to petty pilferings was rampant. Some quaintly worded letters from the Court of Directors have come under notice, but they are too long to quote in full. They refer to the good policy and humanity of a proper care of the sick and wounded, and express the intention of abolishing the practice of allowing surgeons to benefit in proportion to the number of sick and duration of their stay in hospital. It is evident from these papers that it took many years to break this pernicious system down, and that the greatest opposition to a clean administration of the hospitals came from the

surgeons themselves. Some amusing correspondence is available as to rank and standing in the service, and as to disputes between assistant surgeons who were appointed at home and those who were entertained in India. Thus a Mr. Bainbridge contends that his indenture directs him to go "to Fort St. George or any of the Company's settlements where his services may be wanted," hence when he reached Madras his friends advised him to come on to Berhampur, where he was told there was the greatest need of assistant surgeons, but the Board resolved that he was to await orders and to rank as an assistant surgeon appointed in the country below those sent from home. Doctors who had been some time in a station, and presumably made some reputation and established a practice, constantly refused to move when ordered to do so. Their only penalty seems to have been a loss of all further promotion. The case of Mr. J. Williams, of Jaunpur, is typical. He was ordered to go to Dinapur, but begged that he might be allowed twelve months to settle his private affairs, "as owing to his situation in the Service for some years past having scarcely afforded him subsistence, he had been induced, with a view to providing for his family, to enter into some concerns of a private nature to leave which, together with the bungalows and other conveniences with which he had furnished himself at considerable expense, would be attended with a very heavy loss at that time." He was allowed to remain, but without allowances.

Some curious details are given as to the cost of drugs, which seem to have been very expensive in 1786. For example, the supply of Glauber's salts in the stores ran out in August, 1786, and, as none could be expected for six months, the apothecary was authorized to purchase eighteen hundredweight in the market at a cost of Rs. 1,945. At the present day this quantity could be bought in Calcutta for Rs. 165. A schedule shows the retail price of the salt to have been 1 rupee 5 annas the lb.; its present price is barely 4 annas. Ipecacuanha cost 12 annas a lb., cream of tartar cost 13 and rhubarb 4 annas the lb.; their present wholesale prices are 9 annas for the ipecacuanha and less than an anna for the other two. The Company sold medicines from their stores to the general inhabitants of Calcutta at a standard rate of twenty-four per cent profit.

At the period to which these records relate it seems to have been the rule that when medical officers went to England they had to resign the Company's service, but they were given usually a letter recommending them for reappointment and reinstatement

without prejudice to their service. Thus, a Mr. Williams, who was chief surgeon at Patna, asked for three years' leave on half pay, or on full pay if he stayed in India. He was informed that he must resign and be recommended for readmission should he return. He retorted by officially complaining that Mr. Ellis, the physician-general, had been promoted over his head, although Ellis had been nine years at home without doing anything for the Company. He obtained no satisfaction and resigned. Another and pathetic letter is from a Mr. Gillies, who asked for three years' leave owing to his health having broken down after seventeen years' continuously in Bengal. He got his leave, but only under the condition of resignation. It is not until one has read old papers like these that one realizes the onerous terms of service in the earlier years of our occupation of India. Truly the men of this day have much to be thankful for, and it is a pity that some of the young men of our time do not appreciate the facts. Going home in the old days was no joke, for I came across a letter from Assistant-Surgeon Burt, bearing the date May 7, 1787, stating that he had been fifteen months on the voyage, as the Indiaman on which he was had repeatedly to wait for convoys because the British nation was then contending with enemies in every part of the world. Similarly, a letter from Mr. Stormouth, the head surgeon at Dinapur, asks the Honourable Court of Directors that in case of his being shipwrecked this side of the Cape of Good Hope he might not be considered out of the Service. The request was not granted.

One could fill many pages with odds and ends from these old papers; those presenting facts of medical interest have been summarized as well as possible, but there remains much more of general Service interest. Some day, perhaps, one will have time and energy to serve the material up in readable form. Anyhow, it is hoped that this somewhat sketchy and superficial article may interest the reader, and, perhaps, induce others to dip into old files and records. I may be odd in my taste, but to me the rummaging among documents of the kind is irresistibly fascinating.

NOTES ON THE INCIDENCE OF MALARIA AMONG EUROPEAN TROOPS IN THE SIERRA LEONE COMMAND, WITH SPECIAL REFERENCE TO THE EFFECT OF MOBILIZATION.

BY LIEUTENANT-COLONEL C. E. POLLOCK.

Royal Army Medical Corps.

FROM August 1 the majority of the R.A. and R.E. were stationed in the forts. Being the middle of the rainy (i.e., fever) season, and the forts being known to be centres of malaria infection, a great increase in its incidence was anticipated.

Prophylactic Measures.—The verandahs of the barrack rooms and the doors of the casemates in the forts are protected by mosquito-proof wire gauze. Each man has in addition a mosquito curtain.

During the month of August fifteen grains of hydrochloride of quinine were given in solution to each man on Friday and Saturday of each week. The quinine was administered by the N.C.O., R.A.M.C., in charge of the post. After each dose of quinine many men complained of headache, dizziness and nausea. In some cases the men were obviously shaky and not in a fit condition to perform their duty for some hours afterwards. From September onwards the dose of prophylactic quinine was accordingly reduced to ten grains twice weekly.

Incidence of Malaria.—Comparing the year 1913 with 1914, we find the admissions were as follows :—

Period		Average strength		Total admissions		Ratio per 1,000
Jan. 1, 1913—Dec. 31, 1913	.. ..	288	..	117	..	406·4
Jan. 1, 1914—Dec. 31, 1914	.. ..	287	..	442	..	1515·6

Taking only the first six months of mobilization, and a corresponding period for the preceding year, we find the following :—

Period		Average strength		Total admissions		Ratio per 1,000
Aug. 1, 1913—Jan. 31, 1914	.. ..	291	..	68	..	233·5
Aug. 1, 1914—Jan. 31, 1915	.. ..	271	..	393	..	1450·2

An analysis of the medical history sheets of 50th Company R.G.A. was then made in order to ascertain whether the incidence of malaria was affected by the length of time spent in the Command.

TABLE BY DRAFTS SHOWING MEN ADMITTED FOR MALARIA.

Date of arrival of the draft and strength	October 1, 1913, 56 men	February 21, 1914, 57 men	July 1, 1914, 70 men
Time in the command ..	15 months	10 months	6 months
Number of men admitted for malaria between Aug. 1 and Dec. 31, 1913	42	38	51
	75 per cent	66 per cent	73 per cent
Number of men not admitted at all for malaria	11	15	18
	19.6 per cent	26.3 per cent	25.7 per cent

TABLE BY DRAFTS SHOWING THE ADMISSIONS FOR MALARIA.

Draft and strength	October draft, 56	February draft, 57	July draft, 70
Period in the command previous to mobilization	10 months	5 months	1 month
Admissions for malaria .. {	26	18	5
	464.3 per 1,000	316 per 1,000	71.4 per 1,000
Monthly average {	2.6	3.6	5
	46.4 per 1,000	63 per 1,000	71.4 per 1,000
Period in the command previous to mobilization	5 months	5 months	5 months
Admissions for malaria .. {	99	85	125
	1767.8 per 1,000	1491 per 1,000	1785.7 per 1,000
Monthly average {	19	17	25
	353.4 per 1,000	298 per 1,000	357 per 1,000

The following Table comprising the R.G.A. and R.E. confirms the above.

Strength	Total admissions for malaria from February 1, 1914, or date of arrival in the Command to January 31, 1915	Admissions for malaria from August 1, 1914, to January 31, 1915	Number of men not admitted at all for malaria
218	401 = 1839.4 per 1,000	362 = 1660 per 1,000	66 = 30.2 per cent.

These tables show that the incidence of malaria depends more on the degree of exposure to infection than on the length of service in the command. They also show that after six months' residence in a malarious spot, and in spite of the prophylactic measures enumerated at the beginning of these notes, roughly seventy-five per cent of the troops will have suffered from malarial fever. It may be remarked that during this period the rainfall was the lowest ever recorded in Sierra Leone.

Last year's experience does not support the idea, not infrequently expressed in Great Britain, that the climate of West Africa has undergone a mysterious change in recent years, rendering it less detrimental to the health of Europeans residing there. It will be noted that some thirty per cent of the R.G.A. and R.E. were not admitted to hospital for malaria. It must not, however, be presumed that thirty per cent of Europeans are immune to malaria. A certain number, twenty-five out of sixty-six, as nearly

as can be estimated, were permanently stationed at Tower Hill, and therefore, only slightly exposed to infection. If this number is deducted from the sixty-six, we get a percentage of 18·8 apparently immune to malaria in the conditions prevailing at the forts. Moreover, a certain number of these "apparent immunes" have also had mild attacks of fever for which they have not reported sick, and not infrequently men admitted for diseases other than malaria were found to be harbouring malaria parasites in their blood.

Another point of interest noted in connexion with the incidence of malaria was that the prophylactic quinine was given on the afternoons of Fridays and Saturdays, and the admissions for malarial fever between 12 noon on Saturdays and 6 p.m. Sundays, were usually equal to or greater than the number similarly admitted during the remaining six days of the week.

This regular occurrence suggests that a prophylactic dose of 10 gr. of quinine hydrochloride may just suffice to precipitate an attack of fever.

The routine treatment of malaria fever was 20 gr. of quinine hydrochloride daily while in hospital for the first week, then 10 gr. daily for the remainder of the stay in hospital, after which the patient reverted to the prophylactic dose of 10 gr. twice in the week. As soon as the temperature had fallen to normal, a tonic mixture containing 5 minims of liquor arsenicalis was given three times a day in addition to the quinine. This tonic was continued as long as the man was attending hospital after his discharge. On being discharged from hospital the men were kept at Tower Hill, where malaria infection is rarely contracted, until considered fit to return to the forts for duty. In spite of these measures the blood of most cases which relapsed contained numerous malaria parasites.

The efficiency of prophylactic quinine as administered here would not therefore seem to be very great.

Practically every man who had more than two admissions (some men had up to nine admissions) showed marked anæmia and debility; this no doubt was primarily due to malaria and climate, but I feel convinced that the prophylactic quinine was also to a certain extent responsible for this condition.

The total numbers dealt with in these notes are too small to permit of any general deductions being made. It is hoped, however, that the experience gained may contribute, even if in a negative sense, to our knowledge of the prophylaxis of malaria.

AN ACCOUNT OF MY CAPTURE AND MY EXPERIENCES IN GERMANY.

BY COLONEL H. N. THOMPSON, D.S.O.

It has been suggested to me that some account of my capture and captivity, for nearly five months, with the Germans might be of interest to my brother officers and our Corps generally, therefore I have determined to attempt to comply with the suggestion.

The headquarters of the 2nd Division and the whole of the 6th Brigade were billeted in the town of Maroylles, after a very long and trying march on the night of August 25, 1914. It was very dark and our outposts on the south-west of the town were attacked during the night. News also came in that the 4th Guards' Brigade, which was still further south at Landressi, was also heavily attacked. At dawn all our troops had moved out of Maroylles by the road by which we had come in, towards the north. No. 6 Field Ambulance could not be found, and Major F. Irvine and I found ourselves alone in the town with twenty severely wounded men, mostly of the Royal Berks Regiment. Shells began to fall near us so we decided that Irvine should remain. I then followed the Division headquarters, and later left them to try and find the 5th Field Ambulance, as the 6th was not forthcoming, but was not successful. However, I came across some of the 1st Division and also a French Infantry Division—the first French I had seen—and, in advance of them, a French cavalry patrol, strength ten. I returned with this patrol to Maroylles, as I hated leaving my staff officer alone. I had also met a small cavalry patrol of our own under a corporal, and had sent him with a letter to the General Officer Commanding 1st or 2nd Division, asking that at least five ambulance wagons should be sent to me. We then made arrangements to bury the dead, but were shelled from a wood when we attempted to collect them. During the day the town seemed to be alternately in the possession of French and Germans, and changed hands several times, the Germans retiring when the French patrols arrived. All the time I was expecting our own Division to return and pick us up. In the afternoon five ambulance wagons turned up and we fed the wounded with a supply of fresh milk, redressed and loaded them up. The wagons had orders to make for Priche, which was about eight kilometres to the east. When we had got about half a mile

on the road we met a company of Connaught Rangers with two officers, lost, and very hungry and weary, in fact absolutely done; I decided to conduct them back to Maroylles and show them where they could get food. We had left a lot behind. I advised the officers to feed their men and let them rest for the night, thinking that they would be picked up by our troops in the morning. I then started off to Priche. It came on to rain and grew pitch dark. I was on foot, having sent my horse on with the ambulance wagons, the bridle having been stolen when I turned back with the Connaught Rangers. It was a horribly jumpy walk, and I remember a lot of cattle stampeding down the road towards me gave me a horrible fright. When I reached Priche there was no sign of the ambulances, which had taken a wrong road. I tried to find the Mayor, but his house was closed up; so being very tired and wet, I knocked at the first house with a light and was glad to get some bread and beer and a place to lie down. I was awakened by a *curé* knocking at the door, with three more Connaught Rangers whom he had been hiding in the church, and now asked me to take over. The Germans were then entering the town. At first I lay low thinking it might only be a patrol, but a whole brigade came along and halted for breakfast. I then came out, addressed an artillery officer who was near the door, and asked to be brought to the general. He was quite civil, heard my story and asked me to have some breakfast. He had a bottle of champagne and gave me a glass of it. A staff officer then wrote me out a pass which was signed by this general, giving me permission to go back through Belgium to Holland. I left him, but was seized before I left the town and handed over to the Provost-Marshal. Some young officers with him were abusive, called me a spy and other names; they had as interpreter a man who said he was the son of the German Consul in Glasgow and had been at the university there. I was put under a guard with fixed bayonets and made to march behind a company. We came under shrapnel fire two or three times, and when it was growing dark the troops I was with came into action and cut off the Munster Fusiliers at Etreux. That night and the next day I lay in a spinning factory with the survivors of the Munsters. The second day they took me to Etreux, about a mile off, and asked me to assist them with the Munster wounded.

Almost every house in the town was full of wounded Germans and Irish—about two hundred of each—and No. 47 German "Field Lazarette" was working away with two operating tables set up

in a large room in the Mayorie. Private Hill, R.A.M.C., attached to the Royal Munster Fusiliers, did splendid service now and also during the "all-day" battle, as reported to me by Captain Jarvis, the senior surviving officer; also Serjeant Rodgers, R.M.F., who had been the medical officer's N.C.O. orderly and the surviving stretcher-bearers, whose names I do not remember. The surviving officers and men were all loud in their praise of the gallant conduct and work of Private Hill. While there, amidst scenes of terrible suffering and misery, the impression was forced upon me that it would be the most humane course to finish off the very severely wounded as one would do in the case of an animal. I had an opportunity of seeing some excellent surgery there—almost too conservative, I thought.

Herr Hoppe, the *Obarzt*, who was an Emden specialist in women's diseases, was an excellent operator, and most particular in trying to treat Germans and Irish alike, and had them into the theatre in turn. The pure surgery was good, but the administration, sanitation, and feeding arrangements were very poor—in fact, there was no system at all. All the officers of the hospital—six medical and two administrative—had served in cavalry, artillery, or infantry, but not in the Medical Corps until called up for the war. I would like to mention here that I have never seen plaster of Paris so skilfully used. After ten days all the fractured legs and thighs were done up in it, and windows cut to enable the dressings to be done. Very few of the wounded died after the first two days, and some of the most severe seemed to be recovering when I left. While in Etреux I lived with the officers of the hospital. Many German brigades passed through and spent the night; and I never saw any man misbehave in any way, nor did I hear of any—in fact I was astonished at the perfect discipline. There was plenty of wine about, but I never saw a German drunk or war excited. The men took up their billets in a most orderly way, and marched off the next morning without looting anything. I was quite amazed, for they were then a victorious invading army. All ranks seemed anxious to treat the prisoners as well as possible, and carried out various suggestions I made as to: ventilation, which was effected by breaking many windows in the factory; exercising by companies under their own officers in the open; cooking arrangements; construction of latrines outside; washing arrangements. The Germans seemed to be very ignorant on all these sanitary points. All through the town of Etреux, where almost every house contained wounded, washing

water, urine, and food refuse were emptied at the doors each morning. Soon there was a plague of flies, and several wounds became infested with maggots. I was able to collect all the wounded officers into one clean house, the front of which was a shop, and often used as billets for a dozen German soldiers passing through. As the two tables in the theatre did not seem able to cope with the numbers requiring redressings, I started a third dressing table in the open, and for some days worked with the assistance of Private Hill, R.A.M.C., and Serjeant Rodgers, R.M.F. Herr Hoppe then asked me to stop this, but gave no reason. The Germans buried the dead, both British and German, in two great trenches in an orchard at the north end of the town. They put up a cross, and carved upon it "Freund und Feind in Tod vereint." On top of the cross they put a small Union Jack as well as a German flag. They made, besides, about ten separate graves in a field close by for German officers and *feldt-webers*, a rank corresponding to an infantry warrant officer.

On September 8 Herr Hoppe took me with him to Charlerois, where he hoped to get transport and orders as to the disposal of their wounded. He brought me to the general's office and tried to get me a pass into Holland, but the military authorities would not hear of this. I wrote out a statement of my case and claimed to be returned under the Geneva Convention. I saw one of the finest streets in Charlerois burnt down; the rest of the town was not injured. Herr Hoppe told me that after the town had been occupied their transport had been heavily fired upon there from the windows, and that then the street had been burnt. Although all the hotels and cafés were open and free to all, I never saw a drunken soldier nor a man misbehave. I now quote from my diary:

September 11. Returned to Etreux about 2 p.m. yesterday; a horrible experience it was after having left in hope of being returned. Found all prisoners and all the more lightly wounded gone. About eighteen remain, and all seem doing wonderfully. Lieutenant Thomas, Royal Munster Fusiliers, shot through the larynx, still here, so I have taken up my quarters in his room as he wants attention at night having still a tube in the larynx. Many of the fractures have been beautifully done up in plaster of Paris. The Germans are certainly fine surgeons.

September 12. At least a brigade of German troops billeted here last night. No one interfered with us although four officers and a dozen men were in the house. The strength, discipline, intelligence, and good conduct of these crowds of men passing through are

wonderful ; all so cheerful and "well-to-do." No one looks tired or draggled. Bicycles and motor-cars do not last long in war : on every wagon are piled disabled cycles, while motor-cars lie all along the roads.

September 13. Some very heavy German artillery passed through. Visited the battlefield on parole with Thomas ; pools of dried-up blood still all over the place. From T.'s description, most of the Munsters seem to have been in the ditches along the road and the little orchards, the Germans all round in the open fields. It seems wonderful to be able to eat, drink, and sleep normally and even to forget at times the horrible position in which I find myself.

On September 19 was brought to Saint Quentin by Herr Hoppe, as the hospital was rejoining their Division and all the wounded had been disposed of. Lieutenant Thomas was dropped at a hospital in Guise *en route*. Herr Hoppe again tried to get me sent back, but the general took me over, sent me under escort to the station, where I was locked up for the day and at night sent off by train with a non-commissioned officer and man. Had a very slow journey via Brussels, Louvain, Liège, Cöln, down the Rhine, Bingen, Darmstadt, Heidelberg, Stuttgart, to Ulm, where I was lodged in a prison cell for two days. All along this route, which occupied four days, several changes had to be made each day, and I was unpleasantly stared at, but only once, and that by a single individual, called insulting names. The escort was most considerate, kept back crowds, pulled the blinds down to prevent staring, and gave me part of the food brought to them by women and girls at almost every station. The quantities they consumed and the number of cigars they smoked was incredible. They were both Bavarian, and the boy private was a most wonderful story-teller ; he told tale after tale and kept all in the carriage in fits of laughter. I regret to say that I understood but little of the dialect he spoke. At Bingen I had the very unpleasant experience of having to sit for five hours in the public railway restaurant, stared at by everyone.

After two days at Ulm, which I spent in a cell of the civil prison, I was brought on to Ingolstadt, South Bavaria, with some French officers, and we marched out six kilometres, to No. 9 Fort, Oberstimm. There was a crowd of French officers near the inner gate who, when they saw me among the new-comers, shouted "Vive l'Angleterre !" After being searched and asked various questions in the Commandant's office I was

marched off, with eight others, to a dark casemate, No. 74. I was feeling very much exhausted and very miserable, so a kind young Russian, one Mertens, from the next casemate, which opened into ours through an archway, made me lie down on his bed while waiting until our own were brought, and gave me a stick of chocolate. We were each soon supplied with an old iron bedstead with bed-boards, a palliasse and bolster stuffed with straw, two blankets; a small table meant to seat four, a couple of forms, a bucket, a tin washing basin, a couple of large plates and a big basin for soup, with a black-handled iron knife, fork and spoon and one small paraffin lamp completed the furniture of the so-called room. When the soup was served up we had to borrow vessels from those next door until we were able to buy some for ourselves. As there was no room to sit at table (four only could use it), we pulled out two beds and put bed-boards between them, at which the others sat. The same basin given to us for washing was also used for washing up the table utensils. After two days in this dark casemate I was moved into a much lighter one, containing only four prisoners, two being French colonels and the other a private employed as an interpreter. The number in the room was afterwards increased to six. It was more comfortable here as they had bought good table utensils. They told me they had also bought pillows, pieces of bedside matting, and little iron basin stands, as well as a spirit stove for heating food and making coffee, but that all of these had been confiscated as being luxuries. In this room, too, each had a wooden stool instead of a single form, and we bought a second table later on when we became six. The food was nearly always the same. The ration was as follows: at 7.30 a.m. black bread and coffee; at 12.30 p.m. soup, about four ounces of lukewarm meat (which six days out of seven was fat boiled pork), about two potatoes, if small three; one day out of five *chou croute* (raw sour cabbage and vinegar) instead of potatoes; in the evening, at 6.30 more soup (nearly always thrown away) and a slice of sausage, mostly raw; occasionally a small sausage each, boiled in the soup; about every fourth or fifth day, a slice of cheese instead of sausage. No sugar, salt, or butter was allowed on the ration. The ration of black bread was ample (very doughy when fresh; it improved by keeping); a large bottle of good Bavarian beer was allowed to each officer daily, on payment. No tablecloth was ever allowed at meals. At first a sort of canteen was run at which chocolate, cheese, candles, extra bread, sometimes even butter, could be bought, but before I left the sale of all articles of

food had been stopped. Luckily, certain things could generally be obtained by bribing the German soldiers of our guard to buy them for us in Ingolstadt. The interpreter's wife, who lived at her mother's home in Luxemburg, used often to send us boxes of food; he, being employed in the Commandant's office and able to make himself useful, found no difficulty in passing out orders and getting the supplies passed in. But for this we should have often been very hungry indeed. Each officer of the rank of captain and above was paid 100 marks a month; those below that rank 60 marks; 38 marks were deducted to pay for the wretched ration, and fourpence a day for beer. At first merchants were allowed to come in twice a week to sell underclothing, tobacco, fruit, warm waistcoats, sweaters, caps, etc., but that was all stopped. We were also allowed to walk round the ramparts of the fortress, which was just six hundred good paces, but for the last two months prisoners were only allowed to walk about in the two wells of the fortress, each about fifty by twenty yards, and always either deep in snow or a sea of mud, so that one saw nothing of the country round, merely the dead bank or wall on every side. The floors of the casemates, being cement, were very cold and generally remained wet. There was a stove in each room, and from November 15 about ten pounds of coal was issued daily for each, which kept it alight for about five hours and served to dry the floor. I only felt the cold in my feet and suffered much from chilblains; I lost feeling in the balls of both feet and suffered much from burning and tingling sensations in them at night. My left foot, even now, has not quite recovered. Everyone bought sabots with thick wooden soles and lined with felt; they made a horrible noise clattering all about the passages, reminding one of a railway station in Japan; but I have no doubt they saved many feet from frost-bite, certainly my own. At first we attended but one parade a day, at 11 a.m., for the purpose of being counted, but latterly this was increased to four such parades, with a fifth and sixth counting, morning and evening when in bed. This we were told was due to the fact that five Frenchmen had tried to escape from one of the other fortresses; our exclusion from the ramparts was also put down to the same cause. These parades, or *appels* as the French called them, were very tedious affairs and generally each one occupied half an hour. We fell in by fours in order of rooms, with forty orderlies on the left (these were French private soldiers; one was allowed to each casemate to sweep up, clean boots, wash up, bring water, light the stove). First a French officer went

along the line finding out how many were reporting sick in each room, then two more French officers (one along the front, the other along the rear) seeing that the sections of fours were properly completed; then three separate German non-commissioned officers to count the sections. These reported to the Commandant, to whom also the number sick had been reported; then the German non-commissioned officers had to visit all the casemates to prove the numbers reported sick and come and report again; the Commandant then took out his notebook and pencil and worked out the sum. If correct the Germans disappeared, but if some error had been made the whole process had to be gone over again. Fortunately, talking moderately was allowed, so that I used to bring a list of new French words and practise with them; on one day the names of the common trees, on another day the names of the birds, on another of the fish, and so on.

The French have a curious fashion of shaking hands whenever they meet, even coming on parade. A man coming into a room would shake hands with everyone in it, and the same when leaving. The Russians and Belgians seem to do the same; even the Germans do a good deal of it, but their habit is generally to bow all round, keeping the hand at the salute.

When these parades were held for counting four times a day one can imagine how tedious they became; with snow and ice on the ground or in a sea of mud, with snow or rain falling and perhaps a piercing cold wind blowing, they could be very unpleasant indeed. I was the only British officer, among 360 French, 4 Russian and 1 Belgian. Of these, the Belgian and 44 of the French were medical officers. This is usually how my day was spent: 7.30 got up and had a sponge over in a corner of the room near the stove where the floor would dry up easily; then had coffee and black bread; read or did exercises or practised drawing until 9, when the first parade took place; after parade walked about with someone and started a conversation on some subject, i.e., hunting bears and wolves in Russia; a visit of a family to the seaside; the games of the children, etc.; a "5 o'clock" and a polite conversation with the lady of the house about her sons' and daughters' education; on another day, all the different articles used in 5 o'clock tea. With a barrister I would talk about the courts of law and compare their procedure with ours; with a fruit grower or farmer all about his business and so on; nearly every morning I walked and talked with a different man, and always carried a notebook to take down words new to me. The opportunities for

learning French were immense ; would that my memory were good enough to retain it all ! I generally went in and finished a translation or exercise, then there was another counting at 11 a.m., when the doors were locked until 2 p.m.

After the 11 o'clock parade I had a German lesson ; the class was conducted by a French officer who had been a professor at Königsburg University. At 12.30 the midday meal, already described ; after that generally half an hour reading French aloud to learn the correct pronunciation. At 2 p.m. another parade, then half an hour's walking up and down. From 3 to 4 p.m. I held an English class at which we translated the first "Jungle Book." The Frenchmen were wonderfully interested in that and loved to hear sporting items in the jungle and the habits of the wild animals described. There were some members of the class known as "Mowgli" and "Bagheera." At 4 p.m. there was another parade for counting, and it was often the cause of much bad language as the bell would go in the middle of some very interesting passage or incident.

After parade the doors were locked for the night. The German papers and letters generally arrived then and the interpreter, who lived in our room, would translate the official communiqués into French. At 5.30 I always went to Casemate No. 73, and played bridge until 6.30 p.m., when our supper, already described, was served. Reading then until 9.30, when we had to be in bed, and counted yet again, finished the day. The night was long and dreary ; some snored loudly, two in our room did so, but one soon got accustomed to it, and the same snoring notes constantly repeated soon failed to keep one awake. Before I left the parades at 9 a.m. and 2 p.m. had been stopped by the General, to whom a complaint had been made, and we were counted in our rooms at those hours instead. It was a dreary monotonous life, but if one kept busy, always doing and learning something, the time passed fairly quickly. The French often said to me how well my day was parcelled out. I had no time to think except in bed at night. Their mottoes were "Il faut passer le temps," "Il ne faut pas penser beaucoup," and "Il faut s'amuser." They were wonderfully cheerful and full of resource, those poor French, and so bright and clever ; I do not think they felt or resented the hateful position they were in in anything like the way a Britisher would.

One evening they announced a fancy dress parade, and about forty of them turned out, all got up in paper or linen, or nothing, as Judges, Monsieur Epine, Chief of Police in Paris (they all said a

living likeness), well-known German professors, ballet girls, Arab women performing "dances à ventre," primeval man (with a fig leaf and a tail), Red Cross nurses and Parisian society ladies very décolleté, etc. They all marched in procession and did their turns in an open space, where I, with the senior officers, was placed, amid cries of "Le tour," "Le tour," and "Bis, bis." (Some of my readers may not know that a Frenchman never shouts "Encore," always "Bis, bis," when he wants a thing repeated.)

This was one evening's entertainment. They invented all sorts of musical instruments, too, violins, 'cellos, and mandolines, with sounding boards made of polished cigar boxes. The strings the interpreter got smuggled in by German non-commissioned officers; flutes and piccolos were made from things like tooth-brush covers, drums from light wicker-work suit cases; tin plates made cymbals. The "tambour-major" was very magnificent; an enormous man with a red, white and blue plume, all of paper, and a huge staff, silvered with tissue paper too, which he wielded with great effect. This band performed on many occasions and gave a torch-light tattoo on December 31. The casemates all opened, one into the other, through an archway in the side so that a procession could march all down each wing (there were two) without leaving the occupied rooms. The torches were like square Japanese lamps made of thin wire and covered with paper or linen with devices in words and emblems printed and painted upon them. Each man who carried one had made his own. There was a bandmaster, "chef de musique," rank of captain among the prisoners. He with others got up a choir and trained men to sing in parts; they all had their music copied out by hand! Latterly a concert was given in one or other of the two wings once every ten days, and quite ambitious programmes were performed. Concerted music by the choir varied by solos, recitations, many of the songs and recitations being composed by members of the community. They always treated me with marked honours, being the only Britisher, and made me sit in front, generally receiving me with the National Anthem. Each entertainment finished up with the singing of our anthem, the Russian, the Belgian, and finally the grand "Marseillaise" yelled from every throat and encored over and over again.

On Christmas Day an exhibition of all the inventions was held, and entrance money, what you liked to give, was charged, which went to the French Red Cross. Nearly seven hundred marks were taken. An officer dressed up as a nurse held the

collecting box near the door; yellow straw hair, pink cheeks, very red lips, and a false bust décolleté gave the personator a very meretricious appearance. When I appeared "she" threw "her" arms around me, and kissed me on both cheeks, amid great laughter and cries of "Vive l'entente." I tell you I felt much embarrassed. On the opposite side of the entrance stood Monsieur Epine, Chief of the Paris Police, in knee breeches and buckled shoes, frilled shirt, cut-away coat, cocked hat, etc., little pointed beard and moustache. Everything was life-like. I think it must have been so, for this Epine was trotted out on many occasions and was always cheered. The exhibition was called "Concours Epine." It was quite a wonderful show; in addition to the musical instruments already mentioned, the tables down each side (made of bed boards) were beautifully decorated with paper made flowers; there were chessmen, inkstands and pen-holders, an aeroplane suspended from threads, also a Zeppelin, a big grandfather's clock which ticked and struck; a chandelier made of wires for the chapel, various devices for candles and lamps. On a large tray was a model mill, house, wheel, and flower garden in front; inside was a tame mouse, caught and trained by a big French officer of Tourcos, with a uniform fez. When called the mouse, which wore a little decorated collar and cord, would come out, get on to the wheel and send it spinning round as it ran up it at a tremendous pace; so quickly one could scarcely see its feet moving. The mouse seemed never to tire and to enjoy the sport thoroughly.

A daily paper, *Le Journal du Fort*, was sent round to the rooms each day and remained about half an hour in each. It was edited by a major of the French General Staff, who had been a professor at St. Cyr before the war. News was collected from all sorts of sources, paper cuttings sewn in the lining of uniform sent in. Extracts were made from all the German papers allowed, articles written on the war, its probable duration; on the operations, on the economic situation in Germany; information about all the various armies: organization, administration, pay, uniforms, ranks, schools, how officers entered, etc. I gave all the information about our Army, which was gone into very fully and spread over three numbers. This paper was always carefully concealed from the Germans. As regards the economic question, the conclusion came to, after several deeply reasoned out articles on various aspects of the question, was that the war must end about June next. There was also a comic paper published, the *Rigolstadt*. Some of the comic drawings, and caricatures were excellent; the

letterpress was sometimes inclined to be vulgar and too broad, but often very clever. A Jesuit priest who had been acting as stretcher-bearer was among the prisoners, a very smart man and wonderful linguist. He could talk French, German, Italian, Turkish, and classical Latin. He is the only man I ever knew to whom Latin was not a dead language. I remembered my own Latin sufficiently to know that he could really talk it. He also knew something of English, having lived for three years in a religious house at Dover. He was a most interesting man, having spent his whole life in study and observation. His only regret at being a prisoner was that it interfered with his studies. He held a service every afternoon after 4 p.m., which was always crowded; also morning and evening on Sundays and saints' days. A great part of the mass was sung by the choir; a small harmonium was permitted on hire, but later was forbidden and sent back. After a petition to the General it was again allowed. No clergyman was allowed to preach. There were about thirty-nine members of other churches, non-Roman. A French serjeant, who in civil life was a Lutheran *padre*, was brought in from another prison for non-commissioned officers and men and treated as an officer to enable him to minister to these. They too got together a choir and copied out in parts chants and psalm music and sang a great part of the services.

For over three months I never received a letter or card; that was the most trying part of my captivity. Letters were generally delivered in the porch after 4 p.m., the names being called out to a crowd. Day after day I attended and waited, and then went away sick at heart; after a time I stopped going there and tried to forget what was going on. I well knew that, if anything turned up, one of my sympathetic friends would be sure to take it and bring it along to me.

On November 28 I wrote a petition to the Governor about receiving no news, and on that very day, before it had gone, two letters were brought to me. It is hard to describe the effect this had upon me; I felt like a man who had long been buried, and who had just had a glimpse of the world again. A couple of days later two cards came to me, but none ever moved me so deeply as the first two. The news was not good. Several relatives and friends had already fallen, my brother's house burnt down, but I just felt it was good to be alive after all and to be able to know about things again, whether the news was good or bad. On October 17 I was sent to No. 10 Fortress, "Prinz Karl," with three French medical officers. The march was fifteen kilometres and led through the city of Ingol-

stadt. We were allowed to hire a little cart to carry kits. I had none myself, but each Frenchman had a small trunk. However, I was glad of the cart, and sat on it most of the way, as I had been ill for a week and could not have walked the distance. The others marched along beside the cart under a guard. I did not know why I was being sent. "Pour vous gêner," the others said. There were one thousand three hundred French soldiers there, no officers beyond two medical ones, who were now reinforced by the three who came with me. In the Commandant's office next morning I was told there was no work for me at present, but that I had been sent there to await the arrival of prisoners, "black and yellow." This was given out very sarcastically. The Germans were always very bitter because coloured races had been brought to fight against them. The food was much more plentiful here, but I was very lonely and missed the nice friends I had made and the variety of the company possible in the old Fort.

The French soldiers seemed to be quite happy in captivity; they lived twenty-five in each casemate, slept on straw on the floor, and each man had just a blanket. They played a lot of games, using round stones and pieces of stick; also running games like prisoners' base. They struck me as being more childish than British soldiers and seemed very easily amused. Some were gentlemen and held good positions in civil life. I met two university professors and two artists, each having studios in Paris. One of these gave me some drawing lessons while I was there. He had been outside staying at the Commandant's private house close by, painting him, some of his family, and his horses. He was a charming fellow, and I am hoping to meet him again. When I found no work here I petitioned the Governor, appealing to him, as one old officer to another, not to make my detention harder than necessary by separating me from the companions I had grown to like; consequently I was returned to Oberstimm on November 1, and met with a great reception as I came in the gate.

From what I have already written, I hope it is evident that my general opinion of the Germans is not an unfavourable one. In the fortress the prisoner officers were kept with great strictness, and the rations supplied were of the poorest quality, yet they were never subjected to any insult or degradation. In fact, the only objectionable German I met was our Fortress Commandant, an old Lieutenant of Reserve, employed in the Customs at Neurenberg. He went by the nickname of "Fesses d'azur" among the prisoners, in allusion to the light blue uniform he generally wore. I think

he was absolutely unsympathetic and harsh, and thought it his duty to proscribe everything which could increase the comfort of living in the place. Thus, at first, he forbade washstands and small pieces of carpet for the bedsides which had been bought by some officers ; these were afterwards returned. Pillows and any form of tablecloth were also forbidden. Restrictions on writing were severe, though this probably was by order of the Governor. We were allowed to write but three post cards a month, each consisting of sixteen lines only. On one occasion I went to the Bureau and requested permission to write a letter instead of a post card as I had some business questions in connexion with our house near Edinburgh to ask of my niece. I was met with a very curt refusal. On the other hand, I travelled by train for five days, while being brought from St. Quentin to Ingolstadt under escort of an "Unter-offizier" and man, and always found them most considerate in preventing people from staring, and in sharing with me food and drink given to them by ladies of the Red Cross at stations. On the return journey to Holland, when I was being released, it was just the same. I must say that I saw no indication of the intense hatred of the English, now so generally described. I cannot believe that it exists, at any rate among the rank and file of the Army. Nor on my recent journey through Germany did I notice any sign of scarcity of food. I was allowed to buy my meals at the railway station "buffets"; there was always an abundance to be had, and apparently there were no restrictions and no rise in prices. My release came quite unexpectedly. I was holding my usual English class at 3 p.m. when the Commandant came into the room with an escort under arms and told me to be ready to leave in ten minutes. I asked him where I was going, and why, but he only would answer, "Dass macht nichts!" ("That does not matter.") My friends packed up the few underclothes, etc., which I had, in a "Rucksac," also my sabots, a few books, and a pillow which I had succeeded in getting by the special permission of the Governor. I was then taken to the Bureau; all my things were pulled out again and examined. I was given my money, fifteen pounds, in German paper, a mark counting as a shilling, also a receipt for my field glasses, which had been confiscated. By this time the 4 p.m. "Appel" (roll call) was over, and the outer door of the fortress closed for the night. I was refused leave to see anyone or to wish them good-bye, nor was I allowed to hire a conveyance to carry me and my kit the eight kilometres to Ingolstadt. When I got outside the gate the Commandant handed me over to a "Feldtwebel," or warrant officer,

and told me for the first time that I was to be sent to England, via Holland. I could scarcely believe my ears, and when I realized what it meant I could only just prevent myself from shouting. I covered those kilometres stepping out like a youth of 20 years. That night I was locked up in a small room at the station, where a waiter from the buffet came to ask what I wanted for supper. I was not long in deciding on fish, beef steak, with fried potatoes, ending up with an omelette. That was a meal to be remembered, and the sweetest I had had for many a long month. We started at 6 a.m., after I had consumed coffee and sundry white rolls and butter. At midday I had another good meal at a station buffet, and arrived in the evening at Achafenberg, the frontier of Bavaria. There I bid good-bye to my Bavarian escort, who proved to be a very nice fellow, decorated with the Iron Cross, just recovered from three wounds and about to return to the Western front. He was a native of Ingolstadt, a very well-to-do young man of 23, who wore a very smart uniform provided by himself. He felt confident of the final victory of the Germans and of the justice of their cause; said it would be the highest of all honours to die for his Emperor and country, and that German families liked losing some of their sons on the battlefield. I was met by a young "Jager" Prussian officer, with another "Feldtwebel" and two men, and marched to a military barracks a couple of miles out of the town. I was given supper in the canteen and put into an empty officer's quarter by the young officer, who said it was the quarter over his own, and who apologized for turning the key on me. There was a bedroom and sitting-room, both beautifully furnished. In the morning the same young officer brought me to the station and there had coffee and rolls with me. He sent an orderly to carry my kit. He, too, had been wounded, but had recovered and hoped to rejoin immediately; said they hoped to be in London by the end of June, and seemed pretty confident about it. He was under 20 years, and had only just joined from a military college when the war began. A Prussian "Feldtwebel" travelled with me as escort to Bentheim. On arrival there I was searched, and I feared my diary would have been seized, as I had written it up every day while I had been a prisoner; two officers read extracts and discussed it, but kindly decided to return it to me. I was kept under escort on the railway platform right up to the moment the Dutch train started, although I had bought my ticket for Rotterdam and the conductor had taken my kit on board some time before. On the train I met two

Dutch officers, both able to speak English, and both very anxious that the Dutch should come into the war on the Allies' side. I made them angry by telling them that the Germans had told me they expected to annex Belgium, and that Holland would join their Empire of her own free will. One of them was an engineer who had designed and constructed the waterworks at Inverness, so we had a talk about Scotland, which reminded me of the happy times spent there last summer. The next morning I visited the English Consul at Rotterdam, got my passport and a passage to Harwich on a little tramp English steamer, "The Bristol," which landed me safely there after a twenty-hours' passage.

I have made many friends among the French who were my fellow-prisoners, and I shall never forget their kindness, sympathy, and courtesy to me. I luckily have a few of their home addresses, and look forward to meeting them in happier times. If in the future there is an invasion of South Bavaria by the Russians, what a joy it would be to accompany that army and see the fortresses give up their prisoners.

The French certainly know how to make the best of adverse circumstances, and live up to the maxims they used to quote to me :

"Il ne faut pas penser ;" "Il faut passer le temps ;" "Il faut s'amuser."

DESCRIPTION OF A STRAIN OF *TRYPANOSOMA BRUCEI*
FROM ZULULAND.¹

PART III.—DEVELOPMENT IN *GLOSSINA MORSITANS*.

BY SURGEON-GENERAL SIR DAVID BRUCE, C.B., F.R.S.; MAJOR A. E. HAMERTON, D.S.O., AND CAPTAIN D. P. WATSON, R.A.M.C.; AND LADY BRUCE, R.R.C.

INTRODUCTION.

IN previous papers² the morphology of this trypanosome and its action on animals were described. The chief object of this paper is to compare the development of this species of trypanosome with that of the trypanosome causing disease in man in Nyasaland—the *Trypanosoma rhodesiense* of Stephens and Fantham. The development of the latter has already been described.³ It will, therefore, only be necessary here to present the various data in the form of tables and figures, which can then be compared with similar tables and figures in the previous paper.

THE DEVELOPMENT OF *T. BRUCEI*, ZULULAND STRAIN, 1913, IN
G. MORSITANS.

Seven experiments were made with laboratory-bred flies. Three of these were positive and four negative. Two experiments were also made with wild flies, both of which were positive.

TABLE I.—LABORATORY-BRED FLIES.

Date	Expt.	Number of flies used	Experiment positive or negative	Number of infected flies found	Number of days before flies became infective	Temperature at which flies kept
1913						
Feb. 11 ..	1857	58	—	1	..	..
„ 17 ..	1909	50	+	10	21	?
Mar. 11 ..	1988	45	+	20	13	84° F. (29° C.)
„ 17 ..	1996	55	—	4	..	..
April 25 ..	2111	50	—	3	..	..
May 26 ..	2188	30	—	1	..	..
June 23 ..	2188A	20	+	8	14	84° F. (29° C.)

Three hundred and eight flies were used and 47 infected flies were found—15·3 per cent.

¹ Reprinted from *Proceedings of the Royal Society*, B., vol. lxxxvii (1914).

² *Proc. Roy. Soc.*, vol. lxxxvii, pp. 498 and 511.

³ *Ibid.*, vol. lxxxvii, p. 516.

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It is difficult or impossible to explain the difference in the ratio of infected flies. Experiment 1857 has only one infected fly in 58; Experiment 1988, 20 in 45. There is no record as to whether Cage 1857 was kept in the incubator or not, but it is to be presumed that it was, as was the habit at that date. From Table III it will be seen that the flies in Experiment 1988 were fed for eight days on an infected dog, monkey, and goat. It is possible that this had something to do with the high rate of infection, but it is impossible to say with certainty. The scarcity of laboratory-bred flies made it out of the question to pursue this line of inquiry. Experiment 2188 has also only one infected fly in 30, but this is capable of explanation. Experiments 2188 and 2188A were carried out for the sake of economy with the same cage of flies. It having become evident (*see* Table IV) that the flies after their first feeding on an infected rat had failed to infect Monkey 2203, the twenty remaining flies were again fed on an infected guinea-pig, with the result that eight of them became infected.

TABLE II.—WILD FLIES.

Date	Expt.	Number of flies used	Experiment positive or negative	Number of infected flies found	Number of days before flies became infective	Temperature at which flies kept
1913						
July 22 ..	2309	50	+	..	34	84° F. (29° C.)
„ 26 ..	2313	50	+	5	24	84° F. (29° C.)

In Experiment 2309 none of the flies were dissected, hence no infected flies were found. In Experiment 2313, only twenty-one flies out of fifty were dissected. These experiments are tabulated here, as they give the number of days before the flies became infective, and thus afford data as to the length of time the cycle of development runs in the fly.

Details of the Five Positive Experiments.

The following table gives the principal details in the carrying out of the five positive experiments. The first three were carried out with laboratory-bred flies, the last two with wild flies.

It would appear from these five experiments that an average period of twenty-one days elapses before the cycle of development of *T. brucei*, Zululand, 1913, is complete in *G. morsitans* and the fly becomes infective.

TABLE III.

Expt.	Day of expt.	Procedure	Remarks
1909	1—9 10 11—29	Flies fed on infected monkey. Starved. Fed on clean Monkey 1970.	Trypanosomes appeared in blood of Monkey 1970 on the twenty-eighth day.
1988	1—8 9 10—22 23 24—29	Flies fed on infected dog, monkey, and goat. Starved. Fed on clean Dog 2007. Starved. Fed on clean Monkey 2058.	Trypanosomes appeared in blood of Dog 2007 on the twentieth day. Monkey 2058 showed trypanosomes on the thirtieth day.
2188a	1—9 10 11—22 23 24—27	Flies fed on infected guinea-pig. Starved. Fed on clean Dog 2254. Starved. Fed on clean Monkey 2298.	Trypanosomes appeared in blood of Dog 2254 on the twenty-first day. Monkey 2298 showed trypanosomes on the thirty-second day.
2309	1—7 8 9—42	Flies fed on infected dog. Starved. Fed on clean Monkey 2316.	Trypanosomes appeared in blood of Monkey 2316 on the forty-first day.
2313	1—4 5 6—15 16 17—31	Flies fed on infected monkey. Starved. Fed on clean Monkey 2318. Starved. Fed on clean Dog 2361.	Trypanosomes appeared in blood of Dog 2361 on the thirty-first day. Monkey 2318 never showed trypanosomes.

Details of the Four Negative Experiments.

The following table shows the method of procedure in carrying out the four negative experiments. In each of them laboratory-bred flies were used :—

TABLE IV.

Expt.	Day of expt.	Procedure	Remarks
1857	1—8 9 10—60	Flies fed on infected monkey. Starved. Fed on clean Monkey 1941.	One infected fly found on the sixty-second day.
1906	1—9 10 11—55	Flies fed on infected monkey. Starved. Fed on clean Monkey 2031.	Four infected flies found.
2111	1—8 9 10—14 15 16—30 31 32—43	Flies fed on infected dog. Starved. Fed on clean Dog 2100. Starved. Fed on clean Monkey 2125. Starved. Fed on clean Dog 2189.	Three infected flies found.
2188	1—8 9 10—27	Flies fed on infected rat. Starved. Fed on clean Monkey 2203.	One infected fly found on the twenty-first day.

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RESULT OF THE DISSECTION OF THE INFECTED FLIES.

TABLE V.—LABORATORY-BRED FLIES. POSITIVE EXPERIMENTS.

Expt.	Time, days	PROBOSCIS		Proventri- culus	Crop	Fore-gut	Mid-gut	Hind-gut	Salivary glands
		Labial cavity	Hypo- pharynx						
1909	33	—	..	..	..	+	..	..	—
1909	34	—	..	+	..	++	++	++	—
1909	35	—	..	—	..	++	++	++	++
1909	36	—	..	++	..	++	++	++	++
1909	37	—	..	..	..	+	+	+	—
1909	43	—	..	..	..	++	++	..	—
1909	47	—	..	+	..	..	+	..	—
1909	50	—	..	..	..	..	+	..	—
1909	51	—	—	..	..	++	++	..	++
1909	57	..	..	—	..	..	++	..	—
1988	22	—	—	..	++	++	++	++	—
1988	23	—	—	—	—	—	+	+	—
1988	30	—	—	+	..	+	+	..	—
1988	30	—	—	—	..	..	+	..	—
1988	31	—	—	..	..	..	+	..	—
1988	31	—	+	+	+	+	+	+	++
1988	31	+	—	+	..	+	+	+	—
1988	33	—	—	..	..	..	+	..	—
1988	34	—	—	..	..	..	+	..	—
1988	34	..	..	+	..	+	+	+	+
1988	34	—	—	..	..	..	+	..	—
1988	34	—	—	..	..	..	+	..	—
1988	34	—	—	..	..	..	+	..	—
1988	34	—	—	..	..	..	+	..	—
1988	34	—	—	..	..	..	+	..	—
1988	34	—	—	..	..	..	+	..	—
1988	34	—	—	..	..	..	+	..	—
1988	34	—	—	+	..	+	+	+	—
1988	37	—	—	..	..	+	+	+	—
1988	37	—	—	+	..	+	+	+	—
2188A	24	—	—	..	..	..	+	..	—
2188A	24	—	—	..	..	..	+	..	—
2188A	29	..	..	..	..	..	+	..	—
2188A	32	..	..	..	..	..	+	..	—
2188A	32	..	..	..	..	..	+	..	—
2188A	32	..	..	..	..	..	+	..	—
2188A	32	..	..	..	..	+	+	+	++
2188A	32	..	..	..	..	..	+	..	—

In Experiment 1909, ten infected flies were found. Three of these had the salivary glands swarming with trypanosomes; in none was the labial cavity or hypopharynx found to contain flagellates.

In Experiment 1988, twenty infected flies were found. Two had an invasion of the salivary glands. In one it is noted that a few active trypanosomes were seen in the labial cavity, and in one that a few "blood forms" were seen in the hypopharynx.

In Experiment 2188A, eight infected flies were found, one of which had the salivary glands swarming with trypanosomes. Parts of these glands injected into Rats 2311 and 2312 gave in both cases a positive result.

TABLE VI.—LABORATORY-BRED FLIES. NEGATIVE EXPERIMENTS.

Expt.	Time, days	PROBOSCIS		Proventriculus	Crop	Fore-gut	Mid-gut	Hind-gut	Salivary glands
		Labial cavity	Hypo-pharynx						
1857	62	—	—	—	..	..	+	..	—
1996	23	..	..	..	..	++	++	++	—
1996	43	..	..	—	—	+	+	+	—
1996	57	—	—	—	..	++	++	++	—
1996	57	..	..	..	..	..	++	..	—
2111	12	—	—	—	—	—	+	+	—
2111	29	—	—	+	+	++	++	++	—
2111	40	—	—	..	..	..	+	..	—
2188	21	..	..	..	..	—	+	+	—

In none of the negative experiments was an infection of the salivary glands found. Nine infected flies were dissected, but not one of these had passed into the infective stage. No parasites were found in the proboscis at any time.

From a consideration of these tables it will be seen that this strain of *T. brucei*, Zululand, 1913, belongs to the same group as *T. gambiense* and the trypanosome causing disease in man in Nyasaland, as far as their development in *G. palpalis* and *G. morsitans* is concerned. This development takes place in the intestine of the fly and, after a varying number of days, passes forward into the salivary glands, where the final stage in the cycle is reached—the infective or “blood forms.” In this group the parasites are never found fixed in the labial cavity as in the *pecorum* and *vivar* groups.

THE TYPE OF TRYPANOSOME FOUND IN THE INFECTED FLIES.

Plate 25 represents the developmental forms of *T. brucei*, Zululand, 1913, found in the proventriculus and salivary glands of *G. morsitans*. A description of the various types found in the different parts of the alimentary tract is not considered necessary, as they are identical with those found in the development of *T. gambiense* in *G. palpalis*, which have already been fully described.¹

¹ *Proc. Roy. Soc., B*, vol. lxxiii (1911).

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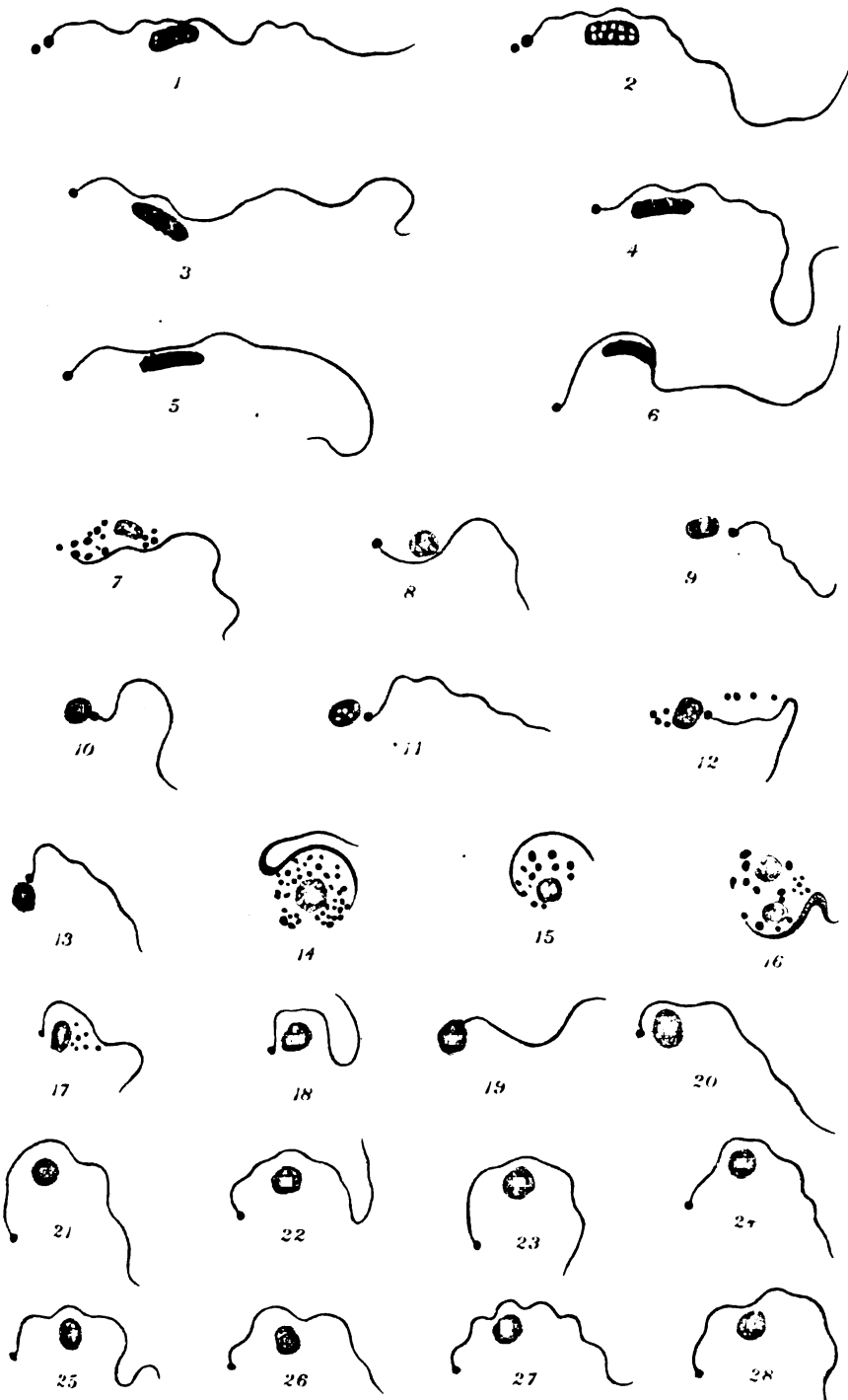
DESCRIPTION OF PLATE.

Figs. 1 and 2.—Trypanosomes from proventriculus.

Figs. 3 to 6.—Proventricular types which were extruded on to a cover-glass by a living non-infective fly.

Figs. 7 to 20.—Crithidial, apparently encysted, and immature "blood forms" found in the salivary glands.

Figs. 21 to 28.—The final stage in the salivary glands—the infective or "blood forms."
Stained Giemsa. $\times 2000$.



Bolt & Larocque 1910

Trypanosoma brucei. Zululand 1913.
Development in *Glossina morsitans*.

Figs. 1 and 2 are two long trypanosomes from the proventriculus. Figs. 3 to 6 are the same, but they were extruded on to a cover-glass by a living non-infective fly, and probably came through the labial cavity from the proventriculus. Some of them may possibly have come from the hypopharynx, and in that case they may have been proventricular forms on their way to infect the salivary glands. Figs. 7 to 20 are various types found in the salivary glands—crithidial, encysted, and immature “blood forms.” Figs. 21 to 28 represent the finished product—the infective or “blood forms.”

If this plate is compared with that representing the developmental forms of the trypanosome causing disease in man in Nyasaland¹ in the proventriculus and salivary glands of *G. morsitans*, the extraordinary likeness between the two is at once evident, and is another argument in favour of these two strains being identical.

CONCLUSIONS.

(1) *T. brucei*, Zululand, 1913, belongs to the same group as *T. gambiense* as regards its cycle of development in the tsetse-fly.

(2) It has been shown that the trypanosome causing disease in man in Nyasaland also belongs to the same group.

(3) The cycle of development of the Nyasaland and Zululand trypanosomes in *G. morsitans* is so marvellously alike that it affords another reason for believing in the identity of these two trypanosomes.

¹ *Proc. Roy. Soc.*, vol. lxxxvii, Plate 24.

THE ADMINISTRATION OF NEO-SALVARSAN IN CONCENTRATED SOLUTION.

BY LIEUTENANT-COLONEL L. W. HARRISON, D.S.O.
Royal Army Medical Corps.

THE number of this Journal for November, 1914, which has just reached me, contained an article by Colonel T. W. Gibbard on the above subject. The following account of its application under field service conditions may serve to emphasize the simplicity of the method, which, as far as I can remember, was introduced by Ravant in 1912 or 1913.

The injections were given in a small hospital marquee, generally three at a time, and nine hundred and sixty-one were administered in five weeks (sixty-two in one and a half hours on one occasion) without any worse result than a few temporarily sore arms.

The technique was as follows: Sufficient tap water was boiled for twenty minutes in ordinary flasks plugged with cotton-wool and allowed to cool. Three all-glass syringes of 5 c.c. (or over) capacity and a gallipot were sterilized by steaming in an ordinary instrument sterilizer. Three medical officers each took a syringe and applied the needle, after shaking off and flaming the adherent remnants of the alcohol in which it had been sterilized; one drew up into his syringe 15 c.c. of the tap water and emptied it into the gallipot; another emptied three doses of the neo-salvarsan into the water; and two, by filling and emptying their syringes out of and into the gallipot, effected its solution in about half a minute. As soon as solution was complete each took 5 c.c. into his syringe and injected it intravenously into one of the three patients waiting with arms ready for the operation.

While the neo-salvarsan was being prepared three patients, each requiring the same dose, were got ready by the attendants. The method of preparation was to seat the patient in a chair, make him rest his arm (bared to above the elbow and congested in the usual way) on a small telegraphist's table on which was a mattress section covered with a sterile towel (sterilized in the Thresh disinfectant). Two tables were used for three patients and would have served for four, but it did not happen to be convenient to inject this number at one time.

The injection was performed in the usual way, the skin being steadied with the left forefinger below the puncture and the needle

thrust, eye up, straight into the vein, the injection being completed as soon as the flow of blood back into the syringe indicated that the needle was in the right place. The needle having been withdrawn the attendant applied a light dressing, and the medical officer cleared his syringe of blood remnants by filling and emptying it two or three times with tap water.

Since the *Spirocheta pallida* could not live in such a concentrated solution of neo-salvarsan, and as the injection is, however temporarily, a prophylactic of syphilis, sterilization of the syringe between injections is not necessary.

The needles used were not very suitable for neo-salvarsan injection, having points which were too long, and sometimes some of the solution escaped into the tissues. On a very few occasions most of it must have so escaped. Although such an accident should be avoided, if possible, it is not one of any great severity in the case of neo-salvarsan. The result is a very painful arm which may require fomentations, but the swelling subsides in a week or ten days.

Considering that, with one exception, none of the medical officers who administered the above number of injections had any previous experience of the technique, it must be allowed that the method is one which is admirably adapted to simple conditions.

Although it is probable that neo-salvarsan is, therapeutically, not so active in corresponding doses as salvarsan, it is quite reasonable to suppose that this defect may be overcome by giving correspondingly larger amounts of it.

Unfortunately for us, our stock of neo-salvarsan has come almost to an end, so we have now to give salvarsan. This is administered in a large marquee, four injections at a time, at the rate of about thirty an hour.

THE RAPID CHEMICAL STERILIZATION OF WATER.

By CAPTAIN V. B. NESFIELD.

Indian Medical Service.

Now that iodine, chlorine, and permanganate of potash have been definitely proved to be reliable for the sterilization of water, surely the unpracticable and cumbersome methods of boiling and filtration for troops on the march will be discarded, and in future military expeditions water-borne epidemics will be a thing of the past.

The points to be settled in connexion with the use of permanganate of potash, chlorine and iodine are :—

- (1) The methods of application.
- (2) The dosage.
 - (a) In cantonments.
 - (b) On the march.
- (3) The best type of water vessels.
- (4) The particular cases in which each chemical is most suitable.

In this inquiry and research no one should cling to a particular apparatus or method because he has introduced it. The entire investigation should be unbiased. In what follows below I will state my own ideas, and may I urge that all practical tests should be controlled by bacteriological tests in the field.

I.—THE METHODS OF APPLICATION.

The following qualifications are necessary for any method to be universally successful :—

- (a) Fragile apparatus must not be used.
- (b) It must be simple.
- (c) It must not give even the faintest taste to the water, otherwise soldiers, particularly sepoys, will evade drinking it.

The chlorine methods I advocate in order of simplicity, and each with its drawbacks are as follows :—

(1) HYPOCHLORITE OF LIME.

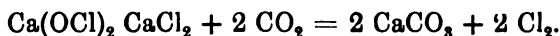
Hypochlorite of lime, even in England, deteriorates ; in India it deteriorates very rapidly and so cannot be used in its imported form. By experimentation I found that it will keep in a sealed glass tube if packed dry and kept in a cool place.

Messrs. Burroughs Wellcome and Co. made for me two gross of such tubes in June, 1911. Each tube contains 25 gr. of hypochlorite of lime.

The hypochlorite is still active (August, 1914), in spite of the fact that the tubes have been left in a hot veranda. But there has been a slow change, and some Cl has left the lime, so that on breaking a tube there is a slight explosion, but there is still plenty of available Cl combined with the lime, and the tube will still sterilize 50 gals. of water.

The lesson to be learnt is to place the tubes in a vessel of water so as to keep them cool, and to mix with the hypochlorite of lime a little potassium hydrate, so as to absorb any Cl which is given off.

Hypochlorite of lime in an open or even corked bottle is decomposed by CO_2 thus:—

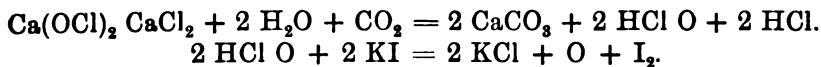


In a sealed tube it is only the chemically ununited Cl which comes off: one might describe this Cl as absorbed, and in physical but not chemical union with the lime.

In connexion with the hypochlorite a dechlorinating 'tabloid' must be used:—

Hyposulphite of soda ...	...	...	25 gr.
Potassium iodide ...	...	...	5 „

Hyposulphite of soda will not fully dechlorinate hypochlorite of lime, a very faint taste always remaining, and I was unable to settle this point till 1911, when I thought of adding KI with $\text{Na}_2\text{S}_2\text{O}_3$ to reduce any hypochlorous acid which might remain, free iodine resulting, which is then absorbed by the hyposulphite. Thus:—



Directions for Use.—Shake the contents away from the end of the tube which has a file mark. Heat this over a match, and then touch the file mark with a drop of water. The capsule cracks across and can now be broken. Dissolve the contents in a pint of water, stirring with the capsule; add this to 50 gals. of water and stir, dissolve the hyposulphite iodine 'tabloid' in a pint of this water, and add it to the chlorinated water after it has stood ten minutes.

I maintain that this is the simplest way of sterilizing water where regiments are concerned, but for famine relief work iodine is better. The only objection to it is that it is not convenient when only 8 gals. or 1 pint is required to be sterilized.

CHLORINE GAS IN CYLINDERS.

Chlorine¹ requires only 6 atmospheres at -5°C . CO_2 requires 30.8 atmospheres.

I have had ten chlorine cylinders with me for the last nine years in India; they have travelled many thousands of miles by rail and road without an accident. The cylinders I recommend contain 10 lb. of liquid Cl , weigh about 20 lb., and stand 3 ft. high on their own base.

The Method of Regulating the Outflow of Gas.—This consists of a brass nozzle which can be screwed on to the cylinder. The nozzle contains a very fine bore glass thermometer tube of such a length that the resistance it gives to the issuing gas allows only half a grain to escape per second (see fig. 1).

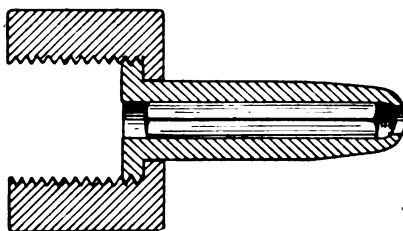


FIG. 1.

The connecting tube is made of bicycle pump rubber and canvas tubing. The end piece is a stout glass tube fitted at one end with a glass stopper and brought to a point at the other end to take the rubber tubing. The stopper has five vertical shallow grooves made with a file, and is held in position with a piece of whiplcord. The gas escapes along the grooves. Should the channels block they can be easily cleaned.

Method of Use.—Turn the tap on full and count one second for each $\frac{1}{2}$ gr. of gas required. The gas may either be passed into 4 gals. of water and this added to any quantities of water to be sterilized, or the gas may be passed direct into, say, 50 gals. of water.

Dose Recommended.—10 or 20 gr. for each 50 gals., i.e., 1 in 175,000 or 1 in 350,000 (see below).

The water is dechlorinated after ten minutes with a few crystals of hyposulphite of soda.

¹ This was first liquefied in 1806 by Northmore.

Spares Required.—An extra key, nozzle, connecting tube and end piece.

CHLORINE PREPARED DIRECT FROM HYDROCHLORIC ACID (WHICH MAY BE LOOKED UPON AS LIQUID CL COMBINED) BY INTERACTION WITH MANGANESE DIOXIDE, OR POTASSIUM CHLORATE.

Apparatus.—A $\frac{1}{2}$ oz. wide-mouthed stoppered glass bottle is taken. Five very shallow vertical grooves are cut on the stopper with a file. A wire collar with two loops is placed round the neck of the bottle as in fig. 2. To the rings are attached a

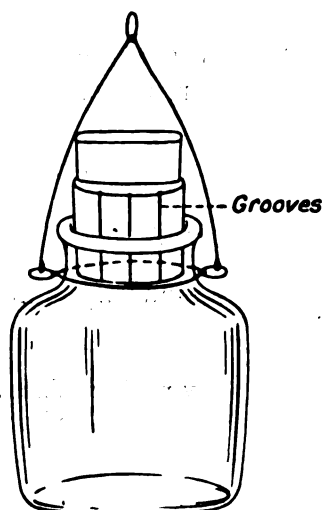


FIG. 2.—Actual size. Rubber band not shown.

loop of string by which the bottle can be suspended, and also a rubber band which can be pulled over the stopper to keep it in place.

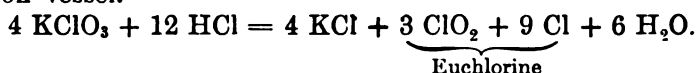
Method of Use.—Place one 5-gr. 'tabloid,' for each 25 gals. of water to be sterilized, in the bottle. Crush the 'tabloids' *in situ* with a metal rod. Now add 15 minims of hydrochloric acid for each 5 gr. of chlorate, put on the stopper, place the rubber band *in situ* and immerse the bottle in 4 gals. of water, or direct into 25, 50 or 100 gals. of water as the case may be. The Cl gas bubbles out vigorously through the five channels and dissolves in the water. If 4 gals. have been chlorinated we know the quantity each

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gallon contains, as 1 gr. of potassium chlorate produces 1 gr. of chlorine.

Thus, if four 5-gr. 'tabloids' were used the 4 gals. will contain 20 gr. of Cl. I recommend $\frac{1}{2}$ gr. per gallon, thus for sterilizing 50 gals. 2 gals. of Cl water must be added, etc.

If the water vessels are 6-gallon ones (mule pakhsals) multiples of six must be employed for dissolving the Cl and a smaller volume of water must be used. Thus for eight 6-gallon vessels 10 gr. of Cl must be dissolved in 8 pints of water, and 1 pint added to each 6-gallon vessel.



COLONEL TREHERNE'S AND CAPTAIN NELSON'S APPARATUS (ROYAL ARMY MEDICAL CORPS JOURNAL, OCTOBER, 1913).

This consists of a generator as used in chemical laboratories, i.e., a small vessel about six ounce capacity, with a rubber cork, and glass tube connected by means of a rubber tube to a quart bottle carrying a rubber cork pierced by a long inlet and a short outlet tube.

I do not consider this a sound apparatus, for the following reasons:—

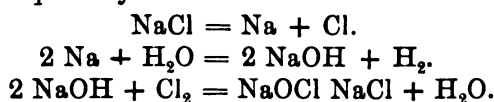
- (1) It is bulky and fragile.
- (2) HCl and moist Cl destroy rubber tubing.
- (3) Rubber corks become very hard and so there is a leakage at the piercings and at the junction of the cork and the neck of the bottle.
- (4) One quart of water is not enough to take up rapidly 10 to 20 gr. of Cl in warm weather.
- (5) The Cl has to overcome a pressure of 6 in. of water so as to escape from the long tube, this causes leakage from the unions.
- (6) Cl water should not be kept for more than a few hours, as some of it soon becomes HCl. Thus $\text{Cl}_2 + \text{H}_2\text{O} = 2 \text{HCl} + \text{O}$.

CHLORINE PREPARED BY ELECTROLYSIS.

This I am convinced has a great future before it where an electric installation exists. I have tried a hand dynamo as used for electro-plating, but at present have not arrived at a suitable machine for military purposes. The apparatus consists of a series of gas carbon disks connected alternately to the poles of the machine. The indicator consists of a graduated narrow glass tube

traversed by a platinum wire from top to bottom. The top of the tube is open and grooved to take a glass stopper.

The whole is immersed in an enamelled iron vessel containing salt solution. The indicator is allowed to fill by removing the stopper, which is again replaced. The platinum wire is attached to the negative wire going to the carbon plates: in this way a fraction of the current goes along the platinum wire, and hydrogen accumulates in the tube, and by its volume a rough estimate can be made of the quantity of Cl formed. Thus:—



IODINE.

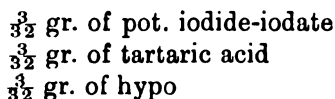
(1) *Tincture of Iodine*.—Water may be tinted very faintly yellow with tinct. iodi.; and then deiodized with a few crystals of hyposulphite of soda.

(2) *Tablets*.—Tablets which will evolve iodine can be made in sizes suitable for sterilizing quantities of water from 1 pint to 50 gals.

“A” tablet consists of one part by weight of potassium iodate and four parts of potassium iodide; “B” consists of tartaric or citric acid; “C” of hyposulphite of soda.

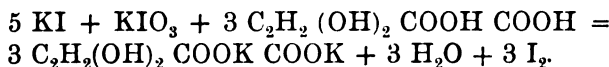
Three-quarter grain of “A,” “B,” and “C” is used for each gallon of water, giving nearly $\frac{1}{2}$ gr. of free iodine per gallon, i.e., 1 in 140,000. Half this quantity may be used for cantonments (see below).

Thus the 1 to $1\frac{1}{2}$ pint size consists of the following:—



—minute quantities enough, but absolutely reliable to sterilize $1\frac{1}{2}$ pints of water in one minute.

Method of Use.—Place one “A” and one “B” tablet in a small vessel, e.g., wine-glass, and just cover with water; crush the tablets, free iodine is formed.



Now fill the wine-glass with water and pour this into 1 or $1\frac{1}{2}$ pints of water, fill the wine-glass with this tinted water so as to

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take up all the iodine and pour this back again. Shake or stir so as to thoroughly disseminate the iodine through the water. Now dissolve one "C" tablet in some of this water; this will take about one minute. Add the solution of the "C" tablet to the iodized water, and stir. The water is instantly rendered colourless and tasteless. If there is any taste or smell, add a small piece of another "C" tablet. If these instructions are carried out there is not the slightest taste or smell, the water is, moreover, more palatable than boiled water and is also bleached.

(3) For large quantities of water and for wells, powders of "A," "B," and "C" are put up in corked glass tubes.

(4) For famine camps the "A," "B," and "C" are in the form of solutions. These are supplied in 2-gallon stone jars, and from these jars pint bottles are filled for daily use. Half an ounce of the solution is intended for 50 gals. of water.

The composition of the solutions is as follows: "A," 19 gr. of iodide mixture, i.e., four parts of KI and one part of KIO_3 ; "B," citric acid, 19 gr.; "C," hyposulphite of soda, 27 gr.; water, $\frac{1}{2}$ oz. The jars are sent with the correct quantity of solid in each. Two gallons of water are added when they are required for use.

The cost is 90s. for three 2-gallon jars of material, which will sterilize 32,000 gals., or 64,000 gals., of water as the case may be (see below), i.e., 355 and 710 gals. per rupee.

II.—DOSAGE.

I find the germicidal values of permanganate of potash, iodine, chlorine, and perchloride of mercury for *Bacillus coli* present in Quetta tap water to be as follows:—

KMnO_4	...	1 in 760,000	...	Acting for 1 hour
Cl	...	"	"	" 10 minutes
I	...	"	"	" "
HgCl_2	...	1 in 5,000,000	...	" 1 hour

FACTORS WHICH INFLUENCE THE GERMICIDAL VALUES OF CL, I, AND KMnO_4 .

(1) *Organic Matter*.—Organic matter instantly absorbs Cl and I, and decomposes KMnO_4 ; this can be shown by adding a drop of tinct. iodi. to a culture tube and then inoculating it: a growth occurs.

Mud.—Though Cl and I are very diffusible they are unable in weak solutions to rapidly penetrate into greasy mud particles. This can be shown by taking Thames water at Victoria Embankment, or mixing a little manure with water; 1 part in 140,000 of

iodine or chlorine will not sterilize such water unless it be first strained through a filter paper.

It will be seen, therefore, that the quantity of iodine or chlorine required to sterilize any given sample of natural water will depend on the quantity of organic matter present and its freedom from mud.

I estimated the quantity of I and Cl absorbed by a large variety of waters (*Indian Medical Gazette*, December, 1905), and found that a clear water from an old disused well absorbed the most, $\frac{1}{8}$ gr. per gallon. To this I added $\frac{1}{8}$ gr. per gallon for germicidal purposes, thus giving $\frac{1}{4}$ gr. per gallon as a safe quantity for clear water, i.e., 1 in 280,000. I think that it is courting disaster to use less than $\frac{1}{4}$ gr. per gallon unless special tests are carried out, e.g., Quetta water only requires $\frac{1}{10}$ gr. per gallon. Out of cantonments, when dealing with unprotected, unknown, and frequently muddy water, I recommend $\frac{1}{4}$ gr. per gallon.

The following are my recommendations :—

(a) For cantonments, standing camps, and engineering camps, where the water supplies are protected and the water clear: I and Cl $\frac{1}{4}$ gr. per gallon to act for one minute in quantities of 1 pint; for five minutes in quantities of 4 gals.; and for ten minutes in quantities of 50 gals.

(b) For unprotected cloudy water $\frac{1}{4}$ gr. per gallon to act for the same time as above.

(c) For muddy water $\frac{1}{4}$ gr. to act for thirty minutes, or 1 gr. per gallon to act for ten minutes.

All the iodine tablets are made to give $\frac{1}{4}$ gr. per gallon.

(d) *Potassium permanganate*, 1 gr. per gallon to act for one hour. The colour can then be discharged by citric acid or lime juice.

(e) *Perchloride of mercury*, 1 in 5,000,000, to act for one hour. This drug has a great future in the sterilization of water. It was used with very good effect in the Banda famine.

III.—BEST TYPE OF WATER VESSEL.

For cantonments any suitable cisterns may be used; for expeditionary and manœuvre purposes, I consider the best vessels are 4-gallon and 50-gallon canvas tanks.

I consider the best pattern to be a low, shallow bag of single canvas standing two feet six inches from the ground. To the margins of the tank are attached six canvas loops. The tank is placed on the ground and filled with water; this bulges out the sides; the loops are passed over six split iron rods stuck into the ground round the tank.

STRAINERS FOR MUDDY WATER.

I have not been able to make an efficient small apparatus for straining water, as after clearing about 20 gals. of water the labour required to pump the water through is enormous.

I find that two layers of blanket filter the water sufficiently for sterilizing purposes, but if there is plenty of time then 1 dr. of alum and 1 dr. of lime per gallon is the best method.

IV.—THE PARTICULAR CASES IN WHICH EACH IS MOST SUITABLE.

For regiments on active service or on manœuvres in peace time, I consider hypochlorite capsules and hyposulphite iodide 'tabloids' to be the best. If these run out or fail then the iodine process 'tabloids.'

For small detachments of men, iodine process 'tabloids.'

For individual use, iodine process $1\frac{1}{2}$ pint size.

For cantonments with an unreliable water supply, e.g., Jhansi, chlorine cylinders.

For famine camps, iodine process in 2-gallon jars ($\frac{1}{2}$ gr. per gallon.

The position of chlorine prepared from $KClO_3$ and HCl : One pint of HCl will sterilize 16,000 gals. of water with the help of $\frac{1}{2}$ lb. of $KClO_3$. Hence this is a very cheap process and very convenient, but it requires a trained man; and strong HCl is awkward to handle; but I consider this should be given a trial, and then it may be found more convenient than hypochlorite capsules; at any rate, every regiment should carry 2 lb. of HCl and 1 lb. of $KClO_3$, as a standby, also two $\frac{1}{2}$ oz. generators.

For wells: Permanganate of potash 2 gr. for each gallon.

LITERATURE.

- [1] "A Chemical Method of Sterilizing Water without Affecting its Potability," *Public Health*, July, 1903.
- [2] "The Chemical Sterilization of Water," *Indian Medical Gazette*, August, 1905.
- [3] "The Chemical Sterilization of Water," *Journal of Preventive Medicine*, October, 1905.
- [4] "Further Experiments on the Bactericidal Powers of Chlorine and Iodine," with a Note on their Application to the Purification of Water on Field Service, *Indian Medical Gazette*, December, 1905.
- [5] "The Chemical Sterilization of Water," Bombay Medical Congress, 1909.
- [6] "The Chemical Sterilization of Water for Military Purposes," *JOURNAL OF THE ROYAL ARMY MEDICAL CORPS*, May, 1912.

Royal Army Medical Corps, Rouen Medical Society.

THE second meeting of the Rouen Army Medical Society was held at No. 11 Stationary Hospital, Rouen, on Saturday, January 30, at 3 p.m. The chair was taken by Colonel B. Skinner, M.V.O. After welcoming representatives from the French Military Medical Services in Rouen, the Chairman announced that arrangements were in progress for obtaining a site more centrally situated for the meetings of the Society. He also stated that Colonel Sir Berkeley Moynihan was arranging with publishers for a selection of medical and surgical works to be forwarded from England for the use of members of the Society.

GUNSHOT WOUNDS OF THE KNEE-JOINT.

By MAJOR W. J. P. ADYE-CURRAN.

Royal Army Medical Corps.

The importance of the proper treatment of an injury to the knee-joint cannot be over-estimated. The efficiency and welfare of the fighting men, with which at the moment we are acutely concerned, is never more jeopardized than by injury to this joint. I propose to confine my remarks specially to those gunshot injuries in which the question of infection arises, and which naturally become at once an anxiety in their diagnosis and treatment. Surgeons who have had experience in dealing with conditions of the knee-joint appreciate its sensibility to infection, and the difficulties which attend the treatment. Flint says sixty per cent of penetrating wounds become infected. In speaking of gunshot wounds of the knee-joint I include those in which the missile has not actually entered the joint, but has caused infection through fracturing bone or damaging tissue forming the joint. The wounds may be caused by the various missiles and weapons which are familiar to us, and the appearance and size vary from small fractured wounds to large lacerated excavations. In every case the question of moment which we are called upon to answer is, has infection of the joint taken place? In some cases

the question is easily answered, but in many it becomes, to say the least of it, a very difficult and urgent point to decide. There would appear to be two lines of action to choose between: the one, procrastination, embodied in that familiar expression "wait and see"; the other, *per contra*, the more heroic, to treat all cases as if infection had taken place. Unfortunately, there are obvious objections to both these courses. To find a solution one feels rather driven into compromising and saying that perhaps a combination of both methods—a middle course—should be adopted. Putting aside for the moment this last consideration, and presuming that we decide on either of the two courses mentioned: in the more conservative we are assisted to a diagnosis by observing the temperature,



Improvised Leg Bath for applying continuous douche to knee-joint.

pulse, and physical appearance of the injured part, and possibly by a blood examination, while in the radical method we presume infective material is present and proceed at once to make provisions for its evacuation. The knee-joint is unsuitable for drainage, and many methods have been suggested for performing arthrotomy. I may mention a few:—

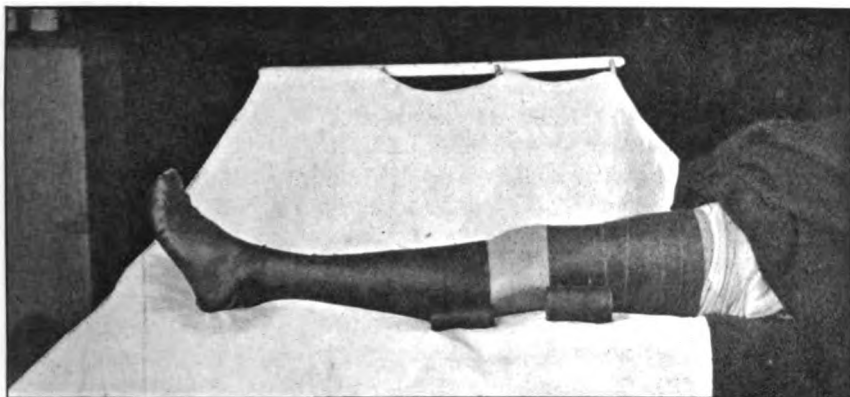
- (1) Antero-lateral incisions, which would act admirably if the patient could be kept in the ventral posture.
- (2) Postero-lateral incisions. On the outer side anterior to the ham-

strings ; on the inner side, between the tendons. Popliteal bursæ may be treated through these incisions.

(3) Transverse incision with section of the patella and division of the lateral and crucial ligaments.

(4) Curved horseshoe incision with division of the patellar tendon and reflection of the patella upwards leaving the posterior ligaments alone intact.

A word about the third course, which I have spoken of as the "middle course." The condition of the joint may be very suspicious and yet we are in doubt. Under these circumstances the joint, by means of a syringe, may be aspirated and washed out with salt solution or mild antiseptic and filled with two per cent formalin in glycerine solution to



Application of Bier's Passive Hyperæmia to the knee-joint by means of Martin's Bandages.

produce a mild amount of pressure in the joint, as recommended by Mr. Murphy, of Chicago, or in dry traumatic arthritis ten to twelve cubic centimetres of sterile vaseline may be injected. Sclerogenic injections would appear to be more applicable to tubercular conditions.

Whatever course we adopt or views we hold with regard to a particular case there is a line of treatment which recommends itself very forcibly to me, and which might conveniently be described as the "bath and bandage" treatment. I refer to the continuous immersion of the part, combined with hyperæmic engorgement. There is nothing new in the component parts of the treatment, but I think the combination merits consideration. Venous congestion of the part may be conveniently carried out by two Martin's elastic bandages ; they may be applied for

eight to ten consecutive hours in the twenty-four, when the patient becomes used to them. The chief points of value of the treatment are lessening of pain, localization of infection, and assistance in the getting rid of infective material. It is suitable for application in both cases.

Baths naturally are only of use to those cases where there is septic



Improvised Leg Bath for employment of continuous douche to knee-joint.

material for removal such as in a drained joint. In these cases the long open bath answers the purpose well. The patient will soon be able to remain many hours without discomfort in it. Where for any reason the patient cannot be taken out of bed, an improvised leg bath, shown in the photo, can be used as a temporary measure. I do not think it matters what, if any, antiseptic is used for the bath, as sterile water

appears to give equally satisfactory results. In using the bath and bandage I have found it convenient to give the bath in the day and apply the bandage at night.

In mentioning this method of treatment I do not wish to imply that such valuable assets as a polyvalent anti-staphylococcus serum *per rectum*, autogenous vaccines, rectal salines, and various recommended lines of treatment are to be discarded; I consider them an assistance to our other forms of treatment. Exposure to fresh air and sunlight in suitable weather has been found a great assistance in suppurating wounds generally.

The reports on the *Transactions* of the Surgical Society of Paris for December 8 and 15, 1914, supply very interesting literature on the experience and opinions of French surgeons with reference to gunshot wounds of the knee-joint.

I have extracted a few of the more important points mentioned in their conclusions.

M. Quenu, in a memoir published in 1910, called "Projectiles as Foreign Bodies in the Knee-joint," noticed the rarity of extraction of foreign bodies from the knee. In the pre-antiseptic days amputation through the thigh was the rule, and when this was not done suppuration invariably led to ankylosis.

Shrapnel balls lodge in the tissues in sixty-nine per cent of cases, and in more than half these cases suppuration supervenes and the wounded man relapses into a condition which leads to amputation or ankylosis.

Laurent, in his book on the Turco-Bulgarian War, on the subject of treatment of knee wounds, writes: "Immobilization is the best treatment, especially with splints; puncture of accumulated fluid, if abundant; or arthrotomy with extensive drainage in case of suppuration. Removal of projectiles embedded in the joint or bony extremities is only indicated if they lead to trouble.

The most important question for the surgeon is the infection or non-infection of the joint; the foreign body takes a secondary place.

M. Quenu writes: "Is it necessary to agree with Laurent's conclusions? I do not think so.

"I was a party to immediate operative interference in shot wounds occurring in civil practice, but I did not wish to draw any conclusions on wounds received on the battlefield, bowing before the experience of those trained in this special branch. Now I am more daring and shall extend my experience of civil practice to that of war."

If the projectile is enclosed in the soft parts of the joint it is all the better to remove it in course of the arthrotomy. If the ball is lodged in the thickness of the bone, conditions are quite different. Certainly the bone is cracked and fissured, and the fissures may extend into the joint. In this case the suppuration of the joint is of first importance, and seeking for the bullet in the thickness of the bone is a very delicate task and

adds greatly to the gravity of the situation. I think, then, it is necessary to go for the most pressing thing and leave the extraction of the bullet.

A bullet free in the cavity of the joint calls for operation as the foreign body, always large, is the cause of arthritis or stiffness more or less delayed.

I have often noticed this stiffness after wounds in battle, and early extraction of the bullet appears to me the best procedure to follow.

With reference to experience in the present war, M. Sebileau says: "Foreign bodies, however aseptic they may appear, always set up arthritis sooner or later; some cases, quite aseptic, get ankylosis in course of time. Early opening of the joint and removal of the foreign body offers the best chances."

M. Fauri says: "Difficulties of operation are often met with in spite of X-rays, and extensive dissection may be called for."

M. Reynier says: "Bony lesions, especially comminuted fracture of tibial tuberosities, gravely affect prognosis."

M. Delbet recommends early extraction in all cases. Without drainage, but with lavage and injection of nucleinate of soda.

M. Rochard advises immediate extraction in all cases.

M. Tuffier advises extraction as early as possible under modern aseptic conditions. He says: "All cases of suppuration of the knee are grave. Complete cure with all the movements is extremely rare. I have visited numerous hospitals, and in all cases the final result has been movement *nil* or very imperfect."

Dr. Giron reports a case in which the foreign body entered the tibial tuberosity but did not reach the joint. Purulent arthritis supervened. Treated by puncture with trocar and injection of twenty cubic centimetres of ether; five days later, on the second puncture, muddy fluid escaped, but non-purulent. Ether was again injected, with a good result.

NOTES OF A CASE IN NO. 9 GENERAL HOSPITAL.

Private W. W., London Rifle Brigade, wounded on December 16. Admitted to hospital on December 18 with a shrapnel bullet wound of right calf, with a track leading upwards towards the knee-joint; the wound was suppurating. The wound had the original dressing applied when admitted. The knee was greatly swollen, tense and painful, with marked redness, swelling and œdema over the inner tibial tuberosity. Temperature 104° F.; pulse 108; respiration 28. Joint appeared infected. Under an anæsthetic a small incision was made. At the outer and lower part of the joint the synovial membrane presented and was punctured. Turbid fluid containing shreds escaped. The incision was then enlarged upwards, making an antero-lateral one; an external postero-lateral incision was also added. Tubes were used. The bullet was subsequently located by X-rays, completely buried in the posterior part

of the inner tibial tuberosity, near the articular surface. The bone was splintered. The foreign body was removed through an incision on December 28. Bath and bandages were used. The patient is progressing favourably, but a partially ankylosed joint can only be expected.

MEMORANDUM ON THE TREATMENT OF WOUNDS OF THE KNEE-JOINT.

By MAJOR A. J. HULL.

THE surgical experiences of the present war suggest that the influence of the surgical work in South Africa exercises an untoward effect upon some surgical procedures.

Although in previous campaigns the treatment of clean bullet wounds by one dry antiseptic dressing, which was not removed until the patient reached a base hospital, proved successful, and notwithstanding that this treatment is recommended in most works of military surgery, the experience of the present war is otherwise, and the treatment of wounds by an undisturbed dressing is to be deprecated.

Dressings should be wet cyanide gauze wrung out in one to forty carbolic. The dressings should be changed as often as possible.

The infection of the wounds may be regarded from two points of view :—

(1) *The Superficial Infection.*—This is a secondary infection from the skin adjacent to the wound or from accidental infection. This infection is probably of small importance and will be met by painting the skin with iodine and by antiseptic dressings.

(2) *The Deep Infection of the Wound.*—This infection is primary; the infection is carried into the depth of wound by the bullet or shell. The deep fascia usually perforated by a mere slit makes superficial treatment by iodine or antiseptic dressings futile. It is in such cases of deep infection that severe septic infection, anaerobic infection, and gangrene are liable to occur.

The only prophylactic treatment likely to benefit the patient is an early incision. This can be conveniently carried out under ethyl chloride. The wound should be irrigated with dilute iodine solution and wet antiseptic dressings frequently applied. The knee forms the exception to the rule of immediate incision, but should be drained when infection is diagnosed.

The following recommendations are made: Wounds should not be sutured. Dry dressings should not be used. Dressings should be changed as frequently as possible during the journey from field ambulance to the base. Severe wounds complicated by injury to bone should, as a routine measure, be incised and drained. This incision should be made

at the field ambulance or clearing hospital as a precautionary measure. In the case of the knee, as soon as a diagnosis of suppuration is made, provided adequate treatment can be carried out.

The surgical theatre of war may be divided into three zones: The zone of first aid—from the front to the field ambulance; the zone of transport from the field ambulance to the base hospital; the zone of rest at the base. There is only one place of choice at which an operation can be performed and that is the base hospital; circumstances may render it imperative that an operation be performed elsewhere, but the base remains the place of choice. It is exceedingly difficult to indicate when a septic knee should be operated upon, and I fear that an operation earlier than at the base will be impossible.

The knee-joint may be regarded as a double joint divided into two compartments by the femur. It is impossible to deal with the posterior compartment by an anterior incision. Both anterior and posterior incisions are necessary. If a joint is to be drained a very radical operation must be performed.

Should comminuted fracture of the lower end of the femur be complicated by septic infection of the knee-joint so that the lower end of the femur is represented by numerous fragments lying in a bag of pus, amputation is the most humane treatment. The immediate and remote prospects of such a case are appalling. The mortality of cases of septic knee plus fracture of the femur is exceedingly high, and it is necessary to remember that a man has two legs but only one life.

CASES OF PENETRATING WOUNDS OF THE KNEE-JOINT IN NO. 12 GENERAL HOSPITAL, ROUEN, DURING OCTOBER, NOVEMBER, AND DECEMBER, 1914.

BY CAPTAIN A. C. SEDGWICK.

Royal Army Medical Corps.

THERE were five cases in all. They were all apparently caused by small-bore bullet wounds; there was no case of infection of the general joint cavity. In both Case 1 and Case 2 the popliteal artery was injured and a circumscribed traumatic aneurysm was present.

CASE 1. *Penetrating wound of the knee-joint with injury to the popliteal artery.*—Serjeant H., 2nd Gordons, admitted November 1. Entry wound two inches behind upper border of patella on inner side, exit at centre of popliteal space. Course of bullet probably through posterior ligament close to internal condyle of femur. Joint distended with blood. Slight pyrexia. Tumour with expansile pulsation in popliteal space. Well-marked bruit audible over swelling.

Progress.—Wounds ran an aseptic course and the patient was transferred to England in less than three weeks, by which time the popliteal swelling had considerably decreased in size.

CASE 2. *Penetrating wound of the knee-joint with injury to the popliteal artery.*—Private P., 2nd Queen's, admitted November 1. Entry wound over internal condyle of femur. Exit on outer side of popliteal space, just behind ilio-tibial band. Wounds small and clean. Probable course of bullet: through internal condyle and posterior ligament. Joint distended with blood. A swelling with an expansile pulsation was present in popliteal space. A loud bruit was audible over the swelling; the pulse in the dorsalis pedis was not to be felt, and that in the posterior tibial only with difficulty.

Progress.—Wounds remained aseptic and the patient was transferred to England eighteen days later.

CASE 3. *Penetrating wound of the knee-joint.*—Private C., 2nd Warwick Regiment, admitted November 5, 1914. Entry wound over inner edge of ligamentum patellæ. Exit to inner side of middle line of popliteal space. Wounds small and clean. Probable course of missile: between condyles of femur. There was remarkably little pain considering that the joint had been traversed.

Progress.—The patient did extremely well. The wounds remained aseptic and he was transferred to England in three weeks' time with every hope of obtaining a freely movable joint.

CASE 4. *Bullet wound of the knee-joint with injury to patellar ligament.*—Private M., 1st Gordons, admitted November 29. Entry wound on outer side of ligamentum patellæ. Exit: about two inches from entry wound on inner side of knee. Both wounds small and clean. Probable course of missile: under ligamentum patellæ, grooving anterior surface of tibia. The joint was distended and painful. Slight pyrexia.

Progress.—As the patient recovered it was found that on any attempt being made to extend the knee the patella was drawn several inches up on the thigh; it was evident that the patellar ligament had either been completely or partially severed. Patient transferred to England.

CASE 5. *Penetrating wound of the knee-joint. Wounds septic, but no infective arthritis of joint.*—Corporal P., 2nd Royal Scots, admitted November 17. Entry wound, one inch below upper margin of tibia anterior to insertions of gracilis, sartorius and semi-tendinosus. Exit: about size of half a crown, just internal to patella, near upper margin of the bone. Both wounds were septic. Temperature 100·6° F. Probable course of missile: through head of tibia. There was no pain while the knee remained at rest. The temperature fell to normal in a few days. Though both wounds were septic, and the knee-joint plainly traversed, the infection did not extend to the joint cavity itself. The patient was transferred to England in three weeks' time.

OBSERVATIONS ON WOUNDS OF THE KNEE-JOINT.

BY PROFESSOR MARTIN.

Medecin-major de 1re classe.

WE have had in the military wards of the Hôtel-Dieu Hospital in Rouen about twenty patients with penetrating wounds of the knee-joint. Some of these patients were sent to the hospital direct from the Front, others came from auxiliary hospitals and were sent to our surgical service on account of rather bad complications.

We think that the prognosis of the knee-joint wounds varies according to the nature of projectiles which caused them. The opinion of nearly all experienced surgeons is that the wounds caused by rifle bullets (Lebel or Mauser) are not so serious as the wounds produced by shrapnels which cause certainly not so great harm as the exploding shells.

We must see if projectiles are left in the joint or close to it (in the bones). It is likely that in these cases the need of an operation will be more absolute than when the projectile only crosses the joint.

Let us examine first the cases in which the operation for different causes was performed late.

CASE 1. *Wound of the right knee by shrapnel. Suppurating arthritis of the right knee. Opening of the joint. Amputation of the thigh.*—Man wounded on September 16 by shrapnel bullet in the right knee; sent on the 20th to an auxiliary hospital of Rouen; remained there till September 29 without any surgical intervention. On this date he was taken to another hospital, specially fitted for medical patients, but not surgical operations, for it was not till a week later that the knee-joint, now suppurating, was opened and drained in an imperfect way. The general state became worse and the patient was brought to the Hôtel-Dieu on October 21, i.e., six weeks after he was wounded. The general state was bad; high fever; the limb was half bent, the knee very swollen. We found fistulæ on the inner and outer side of the knee, crossed only by a thin tube. The radiograph showed a shrapnel bullet divided into two parts behind the lower extremity of the femur. On November 3 a large incision on the middle of the outer face of the thigh was made and the joint drained with five big rubber tubes. Antiseptic irrigations were used and a hot wet dressing was applied. The limb was kept motionless. On November 28 there was a large secondary hæmorrhage. Amputation of the thigh was performed immediately. A large hind flap was necessary owing to the extension of the fistulæ on to the fore part of the thigh. There was marked cachexia and very bad general state during several weeks. On January 28 we cut about two inches off the end of the femur protruding out of the stump. The patient is now getting better and better; he will recover.

CASE 2. *Wound of the left knee by shrapnel bullet. Opening of the joint. Suppurating arthritis. Extraction of the projectile too late.*

Death from pyæmia.—A German prisoner, wounded on September 23, was brought to our wards on October 9, that is, more than a fortnight after being wounded. He had a penetrating wound of the left knee-joint, to which a plain, dry dressing was applied.

October 18: Extraction of a bullet at the inner side of the knee.

October 19: Joint opened and free drainage. The leg was put in a plaster splint. High fever and cachexia followed. Death from pyæmia November 4.

CASE 3. Wound of the right knee. Suppurating arthritis. Late opening of the joint. Death from pyæmia.—German prisoner wounded on September 23, in the right knee, sent from Hospital No. 10 to the military wards of the Hôtel-Dieu on October 10, just seventeen days after being wounded.

On October 20 the joint was opened and drained and the limb put in extension. Death from pyæmia on November 13.

CASE 4. Wound of the right knee by a bit of shell. Suppurating. Amputation of the right thigh. Death from pyæmia.—A German prisoner, wounded on November 13 by a bit of shell, was sent to our military wards on November 19, i.e., six days after having been wounded. He had several rather bad wounds, and a large penetrating wound of the inner part of the right knee; this wound was drained and freely irrigated. In spite of this local and general infection occurred. Amputation of the right thigh was performed on November 22. Death from pyæmia on December 14.

CASE 5. Wound of the left knee by shrapnel bullet. Late and too small opening of the joint. Amputation of the thigh.—A German prisoner wounded on September 23, arrived on September 26 at the military wards of the Hôtel-Dieu. Penetrating wound of the left knee by shrapnel bullet.

October 2: Shrapnel bullet extracted.

October 14: Drainage of the joint; the limb was put in a splint.

October 30: Infectious complications and abscesses in the middle of the thigh; amputation of the left thigh very close to the hip-joint. Died on November 6 from pyæmia.

CASE 6. Wound of the right knee by piece of shell. Opening of the joint twelve days later. Amputation of the thigh. The patient recovered.—Man wounded on September 13 by a piece of shell. Nursed from September 29 to December 11 in Forge-les-Eaux, where a double opening of the joint was made on September 25, viz., twelve days after having been wounded. In spite of this opening, drainage and antiseptic irrigations, the patient became worse. He was sent to Hôtel-Dieu of Rouen on December 11.

December 18: Amputation of the right thigh with two flaps. The patient is now better and will recover.

CASE 7. Wound of the right knee by shrapnel. Late opening of the

joint. Bad state. Recovered, but with ankylosis.—Man wounded on December 17 by shrapnel bullet. Arrived in a hospital at Dunkirk on December 20, viz., three days after having been wounded. He was sent to the military wards of the Hôtel-Dieu on January 20, 1915. Bad general state; right knee and leg swollen. The joint was crossed by a tube; two other tubes were at the lower part of the thigh and one of them was deeply engaged under the quadriceps.

January 21: The knee was widely opened on both sides; an abscess in the quadricipital tendon was opened and drained; another abscess in front of the patella was opened.

January 27: General state still bad; high fever (patella to be cut off). The best thing we may hope for is recovery with ankylosis.

CASE 8. *Wound of the knee by shrapnel bullet. Opening of the joint. Amputation of thigh likely. Recovery with ankylosis.*—Wounded on August 22, was nursed in Trouville from August 26 to December 17. One week after his arrival in Trouville a shrapnel bullet was easily extracted from under the quadricipital tendon. Joint suppurated and was opened and drained one week later, viz., three weeks after the wound. General state bad enough to raise the question of the amputation of the thigh.

December 17: This man arrived at the Hôtel-Dieu; he could walk, but ankylosis was complete.

CASE 9. *Wound of the right knee and fractured patella. Opening and draining of the joint. Recovery with local ankylosis.*—Wounded on September 8; arrived in our wards on September 10, patella fractured and splintered in its lower part. The joint was opened on the outer side on September 15 (seven days after the wound); suppurative arthritis followed. Joint opened on the other side, drained.

October 26: Free incision.

January 25: The patient was able to walk, but had local ankylosis of the right knee.

CASE 10. *Wound of the left knee by a piece of shell. Joint opened and drained. No improvement. Amputation of the left thigh. Recovery.*—Wounded on October 6; arrived in our wards on October 11, for wound of the inner part of the left knee by a piece of shell. The joint was opened and drained on October 13, six days after the wound.

October 27: Large incision on the inner part of the knee, much discharge, many splinters were taken out from the upper end of the tibia; a piece of shell was extracted one and a half inches long, half an inch large. Another opening on the fore part of the knee was made; free drainage.

November 23: Fresh incision and drainage. General state worse. Amputation of the left thigh performed January 27. The patient is now getting better.

For these ten wounded men the consequences of penetrating wounds of the knee-joint were terrible. Four died (German prisoners), three

lost one limb (amputation of the thigh), only two recovered and with ankylosis; one is not yet cured and will at least have an ankylosis of the knee.

We think that the cause of these dreadful consequences was the delay between the wounds and the opening of the joint, but it would be wrong to think it is the only cause. We have to take into account the sort of projectile. We shall prove it by the following observations.

CASE 11. *Wound of the knee (Mauser bullet). Recovery.*—Wounded on November 2; arrived in our wards on November 8; a bullet crossed the knee. No complication, no suppuration.

On January 25 this man was able to walk rather easily and could bend his limb at right angle.

CASE 12. *Wound of the knee by bullet. No complication. Recovery with limb half bent.*—Wounded November 2; arrived at the hospital on November 8; a bullet fractured the patella and opened the joint, hydrarthrus present. Good local state.

January 27: Patient is getting well. Can bend his limb to a right angle.

CASE 13. *Wound of the knee by bullet. Drainage. Recovery.*—A German prisoner, wounded on October 30 by Mauser bullet. Came to our wards on November 7; wound two inches above the joint line; parts of clothes drawn in with the bullet, which penetrated the femur; extensive suppuration.

November 10: The bullet and pieces of clothes were extracted; free drainage and outer side of the knee-joint opened. General state good.

January 26: Only a small fistula; all motions of the joint possible.

CASE 14. *Wound of the knee by shell bullet. Hydrohemarthrosis. Recovery.*—A German prisoner, wounded on October 23, came to our wards on November 7. A bullet crossed his knee-joint; the wound soon closed; only a little fluid in the joint, a small hydrarthrus; the limb placed in a splint.

January 27: Patient nearly cured with nearly all movements of the joint.

CASE 15. *Wound of the left knee by Mauser bullet. Drainage. Recovery with ankylosis.*—Wounded on September 8; came to our wards on September 12 for a wound of the left knee by rifle bullet with fractured patella. The patient was in a good state; joint opened and drained.

October 13: Tube taken out.

November 27: An abscess opened.

January 28: Small fistula on the outer part. Ankylosis, but good general state.

The last five observations are better than the first. The patients we speak of had no serious complications; their general state has never been bad.

Three will, perhaps, be able to serve again as their joints are able to

move; the two others are cured with ankylosis. We think that the cause of the difference between these men and the ten we spoke of before are :—

(1) The wounding projectile was in all these cases a rifle bullet instead of a shrapnel bullet or piece of shell, so infection was less likely to occur.

(2) The antero-posterior tract of the bullet in the joint made easier the immediate drainage of the wounds; there was no retention of septic serum.

(3) A fractured patella seems not to make the prognosis worse, but, on the contrary, better. The reason for this seems to be that, in this case, the joint is widely opened and well drained, the fractured patella making drainage easier.

CONCLUSIONS FROM THE OBSERVATION OF THESE CASES.

I think it advisable to act as follows :—

(1) No intervention, but antiseptic dressing in the case of the knee-joint wound by rifle bullet; joint to be immediately immobilized. Later on, operation as soon as the patient gets fever or local inflammation arises.

(2) Immediate operation for all wounds by shrapnel bullets and by pieces of shell. This operation must consist of a wide incision on both sides, followed by packing antiseptic gauze into the wound for the purpose of checking hæmorrhage as well as drainage.

A rubber tube must be put in deeply, only if, on the following days, there is suppuration of the joint. (When speaking of immediate operation, we mean the operation which must be made when the wounded man arrives at the hospital.)

(3) In case of fever and apparent inflammation of the wounded region, make a wide V-shaped flap on the fore part of the knee, fold it up with the patella so as to open widely the joint. Keep the knee motionless by a special splint which will allow easy dressing and irrigation twice a day.

This operation will not cause more impotency than a long suppuration, for in both cases the result will be ankylosis, which is the best thing we can hope for when the joint is suppurating: it is better to get it sooner than later.

(4) Amputation of the thigh will be practised only in desperate cases when the patient might lose his life. We think that it ought to be performed only after the other interventions have been done without success.

Before closing this short paper I must express my thanks to my collaborators, Drs. Vallée, Givé, Michon, and Romain, who are helping me with a great devotion in the care of patients, and the record of cases in the important surgical services of the Hôtel-Dieu Hospital.

Lieutenant J. E. H. ROBERTS, R.A.M.C., said that at No. 5 General Hospital there had been only one case—an injury from a rifle bullet; in this the knee-joint was not infected, and it healed without trouble. At No. 13 General Hospital, at Boulogne, he had a case in which a rifle bullet had entered on the inner side of the thigh, seven inches above the patella, passed down and shattered the lower end of the femur, and emerged through the patella, which was represented by a few fragments of cancellous bone adhering to the margins of an exit wound three inches by one and a half inches. The very extensive bony damage was possibly due to the bullet having been fired base foremost, as many of the German prisoners admitted at that time had in their possession cartridges in which the bullets had been reversed. At the time of admission a yellow fluid resembling liquid fæces was flowing from the wound, and in this Sir Almroth Wright found *Bacillus perfringens* and some tetanus bacilli. Colonel Makins kindly saw the case, and thought that amputation would be necessary. However, an attempt to save the limb was made by means of a large transverse incision across the front of the joint at right angles to the existing wound, removing all the loose fragments of bone, which represented both condyles, and passing a very large drainage tube directly backwards. The cavity into which the lower end of the shaft of the femur projected was swabbed with peroxide, tightly packed with gauze soaked in five per cent saline. The result was successful, and though another operation will be necessary to fix the knee, the ultimate result should be a sound limb with two to two and a half inches shortening. The speaker said that he would urge that where amputation appeared necessary in many cases, an attempt to save the limb should be made by very freely opening the joint by a transverse incision, as the question of obtaining a movable joint did not arise; and although a subsequent orthopædic operation might be necessary, a short limb with a fixed joint was preferable to any artificial limb.

BLESSURES DU GENOU.

DR. EMILE DUVAL.

Médecin Aide-major de 2^{me} classe.

SUR six cents blessés environ, soignés jusqu'à ce jour à l'hôpital St. Gervais, j'ai eu l'occasion d'observer 12 blessures du genou, 5 aseptiques, 7 septiques, dont voici les observations résumées :—

(1^o) 5 BLESSURES ASEPTIQUES.

I.—S., 28 ans. Blessé le 5 septembre 1914; entré le 7 septembre; sorti le 26 septembre.

Plaie en sèton à la face externe du genou gauche par balle de fusil. Orifices d'entrée et de sortie situés symétriquement à 2 cm. des bords de la rotule. Léger épanchement articulaire.

Traitement : Gouttière plâtrée pendant une huitaine de jours, puis massage et mobilisation. Le malade sort guéri le 26 septembre.

II.—B., blessé le 26 août ; entré le 26 août.

Plaie articulaire du genou droit par balle de shrapnel entrée au milieu du creux poplité, et extraite sous les téguments de la région antéro-externe du genou. Hémarthrose peu abondante.

Traitement : Appareil plâtré pendant douze jours. Massage et mobilisation. Sort guéri le 28 septembre.

III.—H., 25 ans. Blessé le 18 septembre ; entré le 20 septembre. Plaie pénétrante du genou gauche par balle entrée à 2 cm. en dedans de la base de la rotule. Légère hémarthrose. La radiographie montre une fracture du condyle interne dont le trait part de l'échancrure intercondylienne pour atteindre le bord interne du fémur à 7 cm. au-dessus de l'interligne articulaire. La balle est encastrée dans le trait de fracture à sa partie moyenne.

Traitement. — Appareil plâtré pendant trois semaines — massage et mobilisation.

Sorti le 17 novembre.—Raideurs articulaires notables. L'extension est presque complète. La flexion n'atteint pas l'angle droit.

IV.—D., 23 ans. Blessé le 10 novembre ; entré le 25 novembre. Plaie transversale du genou droit par balle, ayant traversé l'articulation sans déterminer aucune réaction. Les deux orifices n'ont pas été pansés. Guérison spontanée et intégrale.

La même balle a déterminé à gauche une fracture de la rotule avec arthrite suppurée.

V.—C., 23 ans. Blessé le 20 janvier 1915 ; entré le 23 janvier. Plaie en sillon par balle à la région externe du genou gauche. Orifice d'entrée à 2 cm. en dehors de la pointe de la rotule ; orifice de sortie l'angle externe du creux poplité. Paralysie du nerf sciatique poplité externe. Aucune réaction articulaire.

(2°) 7 BLESSURES SEPTIQUES.

I.—H., 27 ans. Blessé le 29 septembre ; entré le 1 octobre. Phlegmon souscutané de la région interne du genou consécutif à une plaie par balle de shrapnel.

La radiographie montre que celle-ci a traversé presque en totalité l'épiphyse tibiale et qu'elle est située dans la tubérosité externe à 2 cm. de la surface externe et à 1 cm. au-dessous du plateau tibial.

Le 3 octobre.—Ouverture et drainage du phlegmon interne.

Le 23 octobre. — Incision verticale à la face externe du genou. Trépanation de la tubérosité externe du tibia. Le tissu spongieux est infiltré de pus, au milieu duquel on trouva la balle. Il existe maintenant un tunnel complet au-dessous du plateau tibial, que l'on curette et d'où l'on extrait des débris de vêtements. Désinfection du trajet à l'eau oxygénée et à la teinture d'iode. Drainage de part en part.

Le 20 janvier il existe toujours une petite fistule qui nécessitera un nouveau curettage. A aucun moment on n'a noté d'épanchement articulaire.

II.—G., 30 ans. Blessé le 7 septembre; entré le 16 septembre.

Grosse plaie irrégulière de la face externe du genou droit par éclat d'obus. Gonflement énorme. Arthrite suppurée. La radiographie montre une fracture de la rotule, et une fracture sus-condylienne avec pénétration de la diaphyse dans le condyle externe.

Le 17 octobre.—Arthrotomie du genou. Extraction d'une grosse esquille libre, appartenant au condyle externe. Lavage de l'articulation à l'eau oxygénée. Drainage. Appareil plâtré.

24 octobre.—Incision d'un phlegmon poplité.

13 novembre.—Ligature de l'artère fémorale dans le canal de Hunter pour hémorragie grave de la région poplitée.

20 janvier.—Toutes les plaies sont cicatrisées. Fracture consolidée avec raccourcissement de 4 cm. Ankylose du genou.

III.—C., 34 ans. Blessé le 6 novembre; entré le 10 novembre. Arthrite suppurée du genou gauche consécutive à une plaie de la région antérieure du genou par éclat d'obus. La radiographie montre celui-ci logé dans l'échancrure intercondylienne et ayant fracturé la rotule et le condyle interne.

12 novembre.—Incision verticale de 10 cm. le long du bord interne de la rotule. On n'arrive à sentir le projectile encastré au fond d'une rigole creusée dans la gorge trochléenne qu'en plaçant le genou en flexion extrême. Le projectile est extrait en faisant effort avec une curette sur son extrémité postérieure. Il pèse 18 grm. Arthrotomie large. Lavage. Drainage. Appareil plâtré.

5 décembre.—Incision d'un phlegmon profond de la cuisse et du creux poplité.

18 décembre.—Incision d'un phlegmon diffusé à la face postérieure de la jambe.

20 janvier.—Tous les drains sont enlevés et les plaies sont en bonne voie de cicatrisation. La guérison s'effectuera par ankylose. Il existe une augmentation notable du diamètre transversal de l'extrémité inférieure du fémur.

IV.—C., 30 ans. Blessé le 5 novembre 1914; entré le 10 novembre. Arthrite suppurée du genou gauche par éclat d'obus ayant perforé la gorge trochléenne.

Le 13 novembre.—Arthrotomie.

Le 15 novembre.—En raison de l'état général extrêmement grave (température 40°—41°, état typhoïde, carphologie, délire, langue sèche, diarrhée, etc.), on pratique l'amputation de cuisse au $\frac{1}{4}$ inférieur. Guérison retardée par l'apparition d'un phlegmon profond de la fesse gauche, ouvert et drainé à la fin de décembre. Actuellement la guérison est complète.

V.—D., 23 ans. Blessé le 10 novembre; entré le 25 novembre. Arthrite suppurée du genou gauche par balle ayant fracturé la rotule.

27 novembre.—Arthrotomie. Suppression des drains trois semaines après.

Le 20 janvier toutes les plaies sont presque entièrement cicatrisées. Guérison avec ankylose.

VI.—G., 20 ans. Blessé le 14 janvier; entré le 17 janvier. Arthrite suppurée du genou gauche consécutive à une plaie de la région antérieure du genou par éclat d'obus. L'orifice d'entrée est à 1 cm. au-dessus de la base de la rotule.

La radiographie montre le projectile logé au centre de l'épiphyse fémorale.

Le 18 janvier.—Incision verticale passant par l'orifice d'entrée du projectile et ouvrant largement le cul de sac sous-tricipital. L'orifice osseux, situé à 1 cm. au-dessus de la trochlée, est agrandi au ciseau et au martelet. On arrive ainsi à voir et à extraire le projectile.

Arthrotomie.—Le malade présentait en outre une vaste plaie en sétou du bras gauche, gangréneuse et d'odeur putride, avec fraction comminutive de l'humérus et section des trois nerfs médians, radial et orbital. Le 19 le membre supérieur apparaît entièrement gangrené et malgré une amputation haute du bras le blessé succomba le 23 à la septicémie.

VII.—V., 36 ans. Blessé le 6 janvier; entré le 20 janvier. Arthrite suppurée du genou droit. Plaie de la face antérieure du genou (par éclat d'obus extrait à Dunkerque) située à un travers de doigt au-dessus de la base de la rotule.

23 janvier.—Arthrotomie.

Le 1 février.—Tous les drains sont encore en place. La température, qui oscillait autour de 40° à l'entrée, ne dépasse plus 38° le soir. Bon état général.

En résumé, sur 5 blessures aseptiques du genou, la guérison complète a été observée quatre fois. Une fois on note une raideur articulaire persistante, attribuable à l'existence d'une fracture du condyle interne et à la présence du projectile.

Sur 7 blessures septiques dont 6 arthrites suppurées, on note :—

Une mort non imputable au traumatisme du genou; une amputation de cuisse; trois guérisons avec ankylose. Le dernier blessé est encore en traitement, en bonne voie du guérison.

Ces résultats ne peuvent que nous faire admettre sans aucune restriction les conclusions posées par M. Quénu à la Société de Chirurgie de Paris (séance de 2 décembre 1914) concernant les indications opératoires dans les blessures du genou et qui peuvent être ainsi résumées :—

Les projectiles, sans infection articulaire du genou, doivent être extraits le plus tôt possible. C'est là le meilleur moyen d'éviter par là suite les raideurs articulaires.

Les projectiles avec suppuration de l'articulation réclament l'arthrotomie et l'extraction du projectile.

Je voudrais seulement insister dans cette note sur deux points concernant: 1°, l'anesthésie; 2°, la technique de l'arthrotomie.

Presque toujours les blessés atteints d'arthrite suppurée du genou nous arrivent dans un état général extrêmement précaire, indice d'une toxi-infection grave. Pour de pareils blessés, la rachi-anesthésie à la novocaïne constitue la méthode d'anesthésie idéal, sans aucun danger, évitant toute espèce de choc opératoire.

Au point de vue technique nous avons toujours pratiqué l'arthrotomie classique, c'est à dire très large, comprenant deux incisions latérotuliennes, dépassant en haut et en bas la base et le sommet de la rotule, et deux incisions postérieures, l'externe en avant du tendon du biceps, l'interne au niveau de la patte d'oie. Nous y avons parfois ajouté une incision antérieure et supérieure ouvrant dans toute sa hauteur le cul-de-sac sous-tricipital. Les drains sont en caoutchouc rigide, du plus gros calibre. Le membre est immobilisé dans un grand appareil plâtré prenant le pied, et chaque jour on pratique de grands lavages à l'eau oxygénée de toute la cavité articulaire. Plusieurs fois nous y avons associé les grands lavages à l'éther, et leur action nous a paru des plus nettes sur la diminution de la suppuration et la chute de la température.

L'arthrotomie ainsi pratiquée suffit le plus souvent à faire rétrocéder l'infection articulaire. Mais dans les infections très graves où elle est impuissante, dans les cas désespérés où il semblerait n'y avoir d'autre recours que l'amputation de cuisse, il reste une dernière ressource. Sans doute, elle donne finalement un membre inférieur raccourci et ankylosé, mais elle sauve le membre. Elle consiste à ouvrir largement le genou par une incision en H dont la branche transversale coupe le ligament rotulien. On sectionne en outre les ligaments latéraux et les ligaments croisés. L'articulation dont toute la cavité synoviale est ainsi largement ouverte, est tamponnée à la gaze et immobilisée en flexion à angle droit, par un appareil plâtré. Plus tard, quand les accidents infectieux ont disparu, il est facile de pratiquer une résection secondaire du genou pour remettre en rectitude le membre inférieur.

Lieutenant W. RANKIN, R.A.M.C., said: The subject under discussion is such an important one that I feel impelled to take a part in it. So great was the dread of wounds which entered the knee-joint in the pre-antiseptic days that it was the practice to amputate forthwith through the thigh, and the teaching was that thus only could the patient's life be saved. To this day many practitioners believe that the knee-joint is specially susceptible to infection, and go so far as to refuse to allow their patients to have operations for such ordinary lesions as a loose cartilage, fearing lest the patient may lose his leg as the result of having had the knee-joint opened. The whole crux of the matter is that the knee-joint is a complicated chamber which it is exceedingly difficult to drain

completely, and therefore if it once becomes infected the likelihood is that the condition will go from bad to worse. How dreadful and how dangerous to life the lesion is, even nowadays, has been most clearly indicated by the notes of Mr. Martin's cases, where in several instances even amputation was too late to save the patient's life. When it is recognized that the condition once established is a terrible menace to the patient's life then the line of treatment is clear—the utmost effort should be put forth to get the most perfect drainage possible.

Where one fears infection, but is not satisfied that it is really established, one is justified in temporizing, and injections into the joint of weak formalin in glycerine, as advised by Murphy, or of ether as advocated by some of the French school, with a temporary separation of the joint surfaces by means of extension, is a method worthy of being tried, provided one is constantly on the *qui vive* to recognize that things are not going well—then free drainage. How can this drainage be best established?

(1) By means of free incisions on either side of the patella, and others draining the suprapatellar and posterior pouches of the knee with the insertion of large drainage tubes. However large these tubes be it is improbable that every nook, and shelf, and pouch will be thus drained, and if the infection should happily be overcome a stiff knee with fibrous ankylosis will almost certainly result. Realize these two points clearly and then consider a further mode of treatment.

(2) By means of laying the knee-joint freely open with a transverse, curved, or straight incision (I prefer not to cut through the patella and leave bony surfaces exposed in an infected dressing), sacrificing the lateral and crucial ligaments and thus permitting of a complete flexion of the knee-joint with a thorough exposure of all the surfaces of the knee-joint. It is clear that such exposure ought to give efficient drainage and we may hope to prevent thus the development of pyæmia.

All that remains is to fix the limb in the desired position (probably this can best be done with the aid of plaster of Paris bandages) and then the treatment may be aided by means of antiseptic gauze packs and by continuous irrigation with weak antiseptic fluids.

There is no danger to important vessels or nerves in carrying out this treatment, and when once the infection has been overcome a modified "excision of the knee-joint" may be carried out, and the patient should get a firm, good bony ankylosis and, I think, a better leg than one where there is a fibrous ankylosis in the knee-joint.

The condition is a dreadful one and must be tackled fearlessly at the earliest possible moment, if the number of cases saved with a useful limb is to be increased.

Finally, I would advocate early ligature of the external iliac vein in those cases where pyæmia seems likely to occur. I would make it routine treatment in all very bad late cases.

DR. FRANÇOIS HUE.

Rouen.

Le nombre de mes observations sur lesquelles je puis appuyer les conclusions que je vous soumets aujourd'hui, à propos des blessures de guerre intéressant l'articulation du genou, ne sont pas très nombreuses, car je n'en ai réuni que six; mais vous verrez tout à l'heure que mon collaborateur de l'hôpital auxiliaire No. 1, le Dr. Duval, a eu l'occasion d'en soigner un plus grand nombre. A nous deux nous avons eu à traiter dans notre formation sanitaire 1,252 blessés.

Je dois vous avouer tout d'abord que, du fait de mes observations antérieures à la guerre actuelle, je suis nettement conservateur, par principe, dans les plaies infectées de l'articulation du genou. J'estime que l'on doit tout tenter pour éviter l'amputation de la cuisse. C'est à l'instinct chirurgical de chacun de juger du degré de résistance du blessé. Je dis "instinct chirurgical" parce que je ne pense pas qu'il existe de règles possibles à formuler doctrinalement sur ce sujet. Autant je concède qu'on peut, sans trop de remords, amputer une jambe qui permettra plus tard le port d'un appareil prothétique avec appui favorable sur le genou; autant je regarde comme fâcheuse la dernière extrémité qui oblige pour sauver l'individu à amputer une cuisse assez haut, ce qui ne permettra qu'un appareil avec appui sur l'ischion, c'est à dire fort défavorable pour la marche.

Mes observations de plaies du genou par projectiles de guerre corroborent cette constatation devenue maintenant une sorte d'axiome, à savoir: que les plaies, par balle de fusil ou de mitrailleuse, même traversant la squelette, se comportent avec une bénignité relative si on les compare aux traumatismes du genou par les éclats d'obus beaucoup plus dangereux. Il est bien entendu que, dans tous les cas, il faut attendre les symptômes bien nets d'arthrite suppurée pour intervenir. Car plaie pénétrante du genou ne veut pas dire inévitablement suppuration.

Ma conduite dans les cas d'infection articulaire a été celle qu'ont exposée les précédents orateurs et qui est classique, c'est-à-dire le drainage large de l'articulation. Aux quatre drains habituels j'en ajoute souvent deux jumelés qui traversent horizontalement sous le triceps dans le cul de sac synovial afin d'éviter les fusées purulents qui se font si facilement sous le muscle pour remonter parfois très haut. A ce sujet j'avoue que j'ai une préférence pour les drainages avec deux drains accolés qui m'ont toujours paru mieux drainer qu'un seul gros drain à ouvertures toujours trop espacées, quoiqu'on fasse. Le drain métallique que vient de nous présenter Mr. Moynihan me séduirait assez, en mettant à l'abri du resserrement des drains en caoutchouc sous les ligaments latéraux, d'où résulte parfois un mauvais fonctionnement de ces drains. On pourrait même les faire en une sorte de treillis métallique,

ce qui multiplierait leurs ouvertures et leur pouvoir drainant. Reste à savoir s'ils sont bien supportés par les tissus, à cause justement de leur rigidité.

Quant aux irrigations : l'eau oxygénée au tiers, l'eau iodée, l'eau très chaude et alcoolisée m'ont paru suffisamment efficaces.

L'immobilisation a été cherchée avec des appareils plâtrés plus ou moins modifiés sans que j'aie pu en trouver un très bon. Les gouttières plâtrées se ramollissent sous les sécrétions et les lavages quoiqu'on fasse pour les protéger. L'appareil dont vient de nous parler mon collègue, M. Albert Martin, et qui consiste en deux colliers plâtrés tenant la jambe et la cuisse et reliés l'un à l'autre par deux tiges courbes en fer, présente l'inconvénient d'encercler un membre sujet à des poussées de gonflement, d'œdème inflammatoire et même de phlébite. Ce qui m'a semblé le mieux et le plus simple est de placer le membre dans une gouttière en fil de fer bien garnie. L'inconvénient d'avoir à le sortir à chaque pansement, ce qui est évidemment très douloureux, est compensé par bien des avantages, dont un des principaux est de pouvoir mieux surveiller les fusées purulentes de voisinage.

Il faut en effet faire souvent des drainages complémentaires, sous anesthésie locale ou narcose rapide au chlorure d'éthyle.

Il importe aussi d'être bien persuadé que le traitement conservateur, dans le cas d'arthrite suppurée, est fort long ; qu'il dure souvent plus de trois mois et aboutit on peut dire fatalement à l'ankylose du genou. Mais je n'ai pas encore trouvé un blessé qui, mis en face de cette éventualité, demande qu'on lui coupe la cuisse d'emblée. Tous ont mieux aimé souffrir et garder leur membre.

Enfin, tout récemment, j'ai dû pratiquer une amputation de cuisse pour une arthrite suppurée du genou consécutive à un éclatement de la rotule qui avait été soignée près du front et venait de nous arriver avec un état général tellement grave qu'il ne restait plus aucune chance de sauver le blessé autrement. Voici ces six observations résumées :—

Observation 1.—Merlet, Guillaume, soldat au 7^e régt. colonial ; blessé le 8 novembre 1914. Plaie en séton du genou gauche par une balle ayant traversé sous la rotule de dedans en dehors en traçant une fosse sur les condyles. Attouchements à la teinture d'iode. Pansement humide à l'eau blanche (sousacétate de plomb) à cause de l'hémarthrose assez abondante. Pas de fièvre—suites simples, pas d'infection, pas de réaction. Actuellement, près de trois mois après la blessure le genou paraît normal. Il se fléchit facilement à 90°. La cuisse paraît légèrement atrophiée au-dessus de la rotule, cependant à 15 centimètres plus haut la circonférence du membre est de 47 cm. de chaque côté.

Observation 2.—Pradalie, Léon, soldat au 142^e régt. d'infanterie ; entré le 14 novembre 1914. Plaie en séton du genou gauche traversé par une balle de fusil, d'avant en arrière dans l'espace intercondylien ; pas de fracture apparente. Arthrite suppurée du genou. Drain d'avant en

arrière dans le trajet du projectile. Drain double transversal dans le cul-de-sac sous-tricipital et sous-rotulien. Attelles plâtrées latérales. La température revient vite à la normale; très bon état général. Les drains sont maintenant enlevés, plus de suppuration. Les mouvements commencent à devenir possibles et peu douloureux, mais ne dépassant pas quelques degrés. Il n'y aura vraisemblablement pas ankylose complète, mais raideurs du genou.

Observation 3.—Delporte, Henri, Lieutenant au 1er bataillon de chasseurs à pied; entré le 15 novembre 1914. Plaie pénétrante de la face interne du genou gauche par éclat d'obus extrait à l'ambulance divisionnaire de Dixmude. Arthrite aiguë suppurée du genou. Drainage classique; température oscillant pendant un mois jusqu'à 39.5°, puis s'abaissant peu à peu à la normale autour de 37°. Ouverture de trois fusées purulentes vers le mollet et vers la cuisse. Très bon état général. La plupart des drains sont maintenant enlevés. Ankylose probable.

Observation 4.—Couzot, Claude, caporal au 4e régt. colonial, 8 novembre 1914. Plaie du genou droit par éclat d'obus avec fracture des condyles. Arthrite suppurée aiguë; drainage classique. Suites sérieuses; fusées purulentes multiples; fièvre élevée persistante. Ablation d'esquilles osseuses sous chloroforme. Etat général inquiétant d'abord, meilleur ensuite. Paraît devoir guérir avec raccourcissement et ankylose.

Observation 5.—Fanqueux, François, soldat au 29e régt. d'infanterie; entré le 25 octobre 1914. Plaie pénétrante du genou droit par un éclat d'obus ayant pénétré à travers le creux poplité et ayant déterminé un éclatement des deux condyles. Le corps étranger a été retrouvé expulsé, tombé par son propre poids dans le premier pansement. Drainage par le trajet poplité. Drainage consécutif des culs-de-sacs articulaires. La température s'abaisse en un mois vers la normale. A ce moment (29 novembre) hémorrhage secondaire effrayante par la plaie. Ligature efficace de la fémorale dans l'anneau de Hunter. Suites simples. Quelques drainages secondaires. La guérison paraît certaine avec ankylose. Fièvre nulle.

Observation 6.—Gellis, Jean, du 143e d'infanterie, blessé le 7 novembre par un éclat d'obus qui a fracturé la rotule droite. Soigné à Dunkerque; sa fiche porte qu'il a été atteint de tétanos et guéri après traitement par la méthode de bacilli. Il est évacué sur notre hôpital le 19 janvier dans un état déplorable. Amaigrissement extrême, toux persistante. Le genou droit est suppuré et subluxé en arrière en flexion presque complète. Fusées purulentes sur le mollet, en avant et en arrière; une autre largement ouverte dans le creux poplité laisse écouler un flot de pus quand on presse depuis la racine de la cuisse. En présence de la gravité de l'état local et de l'état général on décide l'amputation, qui est acceptée et pratiquée le 18 janvier. La fusée purulente de la cuisse remonte jusqu'à l'aîne dans la gaine des vaisseaux. Lambeau oblique ovalaire antéro-

externe section à l'union du tiers supérieur et du tiers moyen—réunion des deux tiers externes; mèche iodée dans le trajet suppuré. Suites simples. La température, toujours élevée auparavant vers 39°, s'abaisse dès le lendemain de l'opération. Actuellement la température est normale. Le toux a bien diminuée, ainsi que l'expectoration. La guérison paraît certaine.

Colonel Sir B. MOYNIHAN spoke of the extreme gravity of penetrating wounds of the knee-joint followed by infection. It was true that some bullet wounds of the knee remained aseptic throughout; others, however, and all shrapnel wounds, were infected from the moment they were inflicted. If the knee were invaded by pyogenic organisms the joint must be opened freely, by certain well-planned incisions. The anatomy of the knee-joint in its surgical bearings had been first described by H. L. Barnard, in 1903. The knee-joint consisted of three important parts: (a) The upper pouch, which communicated with the suprapatellar bursa almost invariably; (b) and (c) two lower parts separated in the middle by a septum consisting of the ligament of Wrisberg: the cruciate ligaments, and the patella synovial fold. Each of these two parts possessed a large posterior projection in which the femoral condyle lay in extension. The inner of these two projections (which should be known as "Barnard's pouches") extended upwards by a long loose sac; the outer projected downwards along the tendon of the popliteus which it surrounded. When a pyogenic infection gained access to the point it progressed slowly and insidiously, but without pause, until finally one or other, or both of Barnard's pouches were invaded. These pouches might rupture when over-full, and pus would then track upwards into the thigh and downwards beneath the gastrocnemius muscle. The slow invasion of the pouches produced in many cases little constitutional disturbance and few signs that were discovered when the posterior surface of the limb was most carefully examined, and signs and symptoms developed rapidly when the sacs ruptured and pus escaped. The absence of a general systemic affection was possibly due to the scarcity of lymphatic vessels, or to the early plugging of such channels by lymph. In one case in Rouen a triple extension of infection had occurred through the suprapatellar bursa almost as far up as Scarpa's triangle, and upwards and downwards on the hinder aspect of the limb. It was absolutely essential in all septic cases to drain these three sacs. This could only be done by the insertion of many tubes. Two tubes were passed downwards from a central incision into the suprapatellar pouch to emerge on each side of the patella. From the incisions at each side of the patella tubes were passed directly backwards into the popliteal space, emerging on the outer side in front of the biceps tendon, and on the inner behind the head of the semimembranosus. These latter tubes, if of rubber, were so com-

pressed by the firm strictures around the knee as to have their lumen closed. He, therefore, had used for several years metal tubes of oval shape, which secured that free drainage was possible. If the knee were freely drained the use of continuous irrigation, or better, of long-continued immersion of the limb, was a useful auxiliary. As a rule, after all wounds had healed the mobility of the knee-joint was lost or gravely impaired; but both life and a useful limb were preserved. In desperate cases the division of the patellar ligament and the lateral ligament by a wide semicircular incision, followed by the extreme flexion of the knee, the heel being made to press against the buttock, laid bare all the recesses of the joint. Subsequently, resection of the joint would allow of a useful limb being restored to the patient. [These remarks were illustrated by figures drawn by Captain L. R. Braithwaite, R.A.M.C.]



Clinical and other Notes.

NOTE ON THE AGGLUTINATION OF THE MENINGOCOCCUS.

BY LIEUTENANTS SYDNEY ROWLAND AND ADRIAN STOKES.

Royal Army Medical Corps.

It is the experience of all bacteriologists who have worked with the meningococcus that it exhibits very variable agglutination reactions, even to the extent of refusing to agglutinate with an anti-serum prepared from the same strain. Our experience with a rabbit that was immunized with known strains isolated direct from the cerebrospinal fluid is that the strains which were used to inoculate the rabbit sometimes fail to be agglutinated by the serum of the same rabbit. The ability to use the direct agglutination method when searching for the organism on serum agar plates grown from the throats of contacts is so valuable and saves so much time and labour that it is of the first importance to be able to place reliance on the constancy of the reaction.

The explanation of the inconstancy of the agglutination reaction that we offer is as follows:—

The meningococcus is an organism that very quickly shows involution forms in culture. Indeed the presence of these forms, shown by irregularity of staining, is of the greatest aid in the identification of the organism. It is probable that these involution forms are due to autolysis by an intracellular proteolytic enzyme. Whatever the origin of these forms their presence in a culture has been found by us to largely upset the agglutination process.

The following experiment is given in support of the statement that irregularities in agglutinating are very prone to occur in old cultures and that these irregularities disappear in the case where a young culture of the same organism is employed.

AGGLUTINATION IN SERUM DILUTED ONE-FIFTIETH.

Strain	14 hours' growth		48 hours' growth	
Price	..	Good	..	Negative
Coll	..	Slight	..	Negative
Hien	..	Fair	..	Slight
Bak	..	Complete	..	Very little
Jahn	..	Slight	..	Slight
Harr	..	Good	..	Negative
Buch	..	Good	..	Negative
Hep	..	Complete	..	Negative
Pay	..	Complete	..	Negative
Gar	..	Good	..	Negative
		Read after 2½ hours	Read after 6 hours	

The cultures had been in subculture for very nearly the same period, all having been isolated about ten days.

Controls with normal rabbit serum diluted one-tenth were uniformly negative.

SALVARSAN ON MALARIA.

By MAJOR C. E. POLLOCK.

Royal Army Medical Corps.

GUNNER S. was placed on the syphilis register on January 12, 1910, at Port Louis. He then had a rash and shotty glands. He had four courses of mercurial cream injections finishing on May 3, 1913; altogether thirty-three grains of metallic mercury were injected.

Blood taken on July 14, 1913, after his arrival at Sierra Leone, gave a negative Wassermann reaction; a sample taken on October 22, 1913, gave a positive reaction.

On December 18, 1913, he received 0.6 grm. salvarsan intravenously; there was no reaction. Blood taken on January 29, 1914, gave a positive Wassermann. He was then put on a course of weekly mercurial cream injections and received five grains of metallic mercury up to February 21, 1914. On April 25, 1914, he received 0.6 grm. salvarsan; there was no reaction.

As he was leaving the command early in July, 1914, a course of weekly mercurial cream injections, at the man's own request, was begun on May 30, 1914, as he wished to complete his treatment before going on long furlough in England. He received three weekly injections up to June 13, 1914.

On June 20, 1914, after the customary preparation and examination he received 0.6 grm. salvarsan, and was as usual detained in hospital for the night. There was no rise of temperature or other complication and he felt quite well up to 10 a.m. on June 21, 1914. Shortly after when he was about to leave hospital he suddenly "went blind." His temperature was then 99.4° F., and he was at once put to bed. He then complained of slight headache and malaise. The evening temperature was 101° F.; a blood-smear showed subtertian rings.

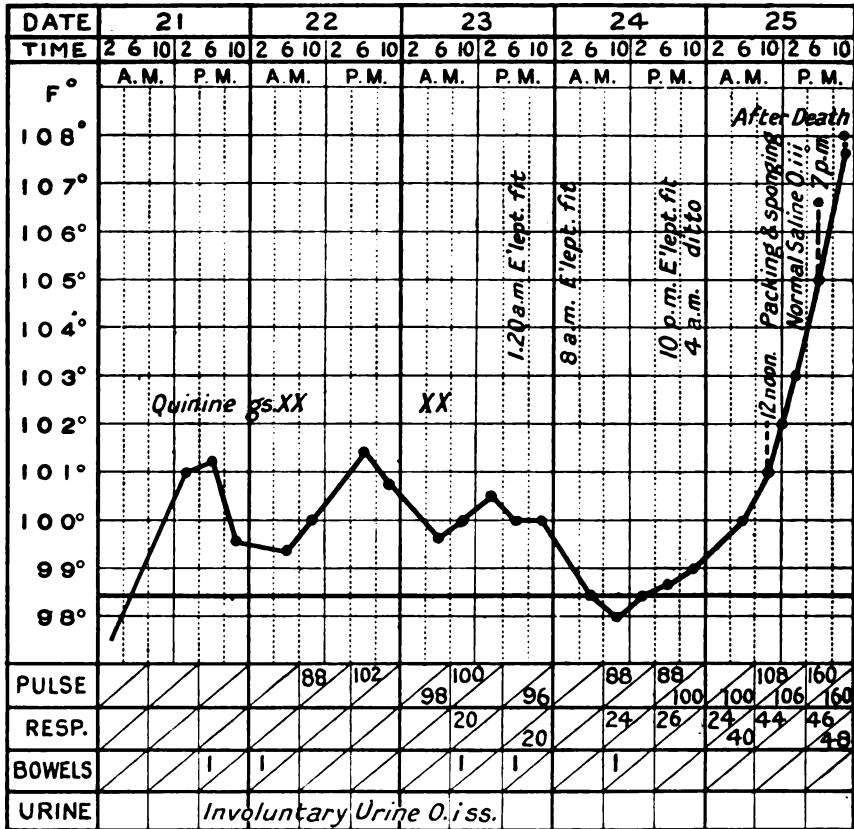
Next morning (forty-eight hours after receiving the salvarsan) he felt quite comfortable, temperature 99.4° F.; he was ordered quinine hydrochloride twenty grains and mist. alba. The evening temperature rose to 101.4° F.

On June 23, 1914, the same treatment was repeated and the case appeared to be an ordinary one of malaria, making the usual progress.

On June 24, 1914 (four days after receiving salvarsan), at 1.15 a.m. he suddenly had a slight epileptiform fit. At 8.15 a.m. he had another similar fit. When seen at 8.35 a.m. he was in a dazed condition, unable to understand or to reply when spoken to. The pupils were normal and reacted sluggishly to light. There was no paralysis or rigidity. During the day he improved and took nourishment. At 6 p.m. his temperature was 98.6° F. He had passed urine and fæces into his bed. He could only speak indistinctly as the movements of the tongue were

not under proper control, but he understood what was said to him. At 10 p.m. there was another similar fit and at 4 a.m. on June 25, 1914, he had a fourth fit.

On the morning of June 25, 1914, his temperature was 100° F., skin moist, pulse 100; he was quite unconscious with laboured, but not stertorous breathing. The bladder was full and was emptied by catheter; the urine did not contain albumin, blood or casts. A blood-smear



showed marked leucopenia, no malaria parasites, but a few chromatin dots in the red cells. The temperature rose steadily and was 102° F. at 12 noon; the unconsciousness became more pronounced.

At 5 p.m. the temperature was 104° F., pulse 120 soft, breathing laboured, but not stertorous. As he had been perspiring freely all day and had not swallowed any nourishment for twenty-four hours, 3½ pints of sterile saline solution were injected intravenously, and a blister was

applied to the temple. These remedies seemed to effect a slight improvement in the general condition. There were slight spasmodic movements of the right facial muscles.

At 8 p.m. the temperature was 107·4° F., pulse 160 soft; cold sponging failed to reduce the pyrexia. Adrenalin chloride 1 in 1,000, five minims, was injected. This brought the pulse-rate down to 120 for about half an hour.

At 9 p.m. the temperature was 107·8° F. Quinine bi-hydrochloride, five grains dissolved in one drachm of sterile water, was injected intramuscularly and absorbed, but had no effect on the temperature. He gradually got weaker, and died at 1.15 a.m. on June 26, 1914.

Post-mortem examination, eight hours after death. Brain, weighed sixty ounces. The pia mater and all the vessels were much congested, the choroid plexus especially so. No petechial hæmorrhages were noted. On the surface of the cortex of each hemisphere on either side of the longitudinal fissure and near its centre, there was a small patch of white fibrous tissue suggestive of old tubercular mischief. In the white matter between the left temporo-sphenoidal and occipital lobes there was a small area of reddish soft tissue about one inch in diameter. This suggested a breaking-down gumma, or a slight hæmorrhage.

The spleen weighed sixteen ounces, and was soft and friable. The kidneys each weighed six ounces; they were congested, but otherwise appeared to be normal. On incising them there was an intense acrid odour. The liver weighed sixty ounces, the margins appeared to be slightly fatty. The pericardium contained about one ounce of clear fluid. The heart and large vessels appeared to be normal.

On microscopic examination malaria parasites were found in the choroid plexus, heart, blood, and spleen.

Specimens of the brain, liver, spleen and kidneys, and also a sample of blood taken post-mortem were sent to the Royal Army Medical College for further examination.

The question arises in this case was death due to cerebral malaria. The temperature chart supports this view, but if so, the injection of quinine should have produced some amelioration in the symptoms.

The symptoms suggested salvarsan poisoning. If so, it must have been an unusual case, as the previous treatment did not provoke any unpleasant complication, and it should also have been sufficient to prevent any changes being produced in the brain by syphilis.

Salvarsan has been used in the treatment of malaria without bad results and, indeed, appears to cure the benign form. This man was one of a batch of six who were injected with salvarsan on the same morning, none of the others had any reaction.

Is it possible that quinine, given forty-eight hours after the salvarsan, produced some toxic combination?

REMARKS ON THE CASE-SHEET, BY MAJOR L. W. HARRISON, R.A.M.C.

"It is certainly a very nice problem, and I should think the case is unique.

"My own impression is that it was *salvarsan plus malaria*; I do not see how either can be absolved. I do not think that the failure of the quinine to benefit is an objection to the malaria solution because it seems to have been given intramuscularly and then, too, the vessels supplying the vital centres were probably blocked already. I believe that the salvarsan stirred up the malaria parasites as anything which acted on, but failed to kill them, would do, and by its action on the cerebral vessels produced a particularly favourable condition for their sporulation there. Probably if there had been no malaria parasites the patient would have had a headache, simply as a result of the cerebral congestion which probably happens in all cases to a greater or less (generally, of course, the latter) extent. The fact that he stood the two previous salvarsan injections without trouble showed that he had not a great susceptibility to the drug.

"I think the reddish area may have been due to a small hæmorrhage."

The specimens sent to London in spirit were examined about six weeks after death by the Professor of Pathology, Major S. L. Cummins, R.A.M.C., who made the following report:—

(1) *Brain*.—No malaria parasites could be demonstrated in the capillaries. There was a considerable collection of blood under the brain, perhaps in part of the choroid plexuses. None of the corpuscles seen in this mass on section contained malarial parasites.

(2) *Kidney*.—There was considerable nephritis. The lining of the tubules was desquamating and showed degenerative changes. There was some malarial pigment to be seen.

(3) The spleen contained many free crystals of a yellow colour—probably a derivative of hæmoglobin but *not* malarial pigment. There were a few sub-tertian parasites and a considerable amount of malaria pigment in the leucocytes.

(4) The liver showed a very curious engorged and hæmorrhagic layer under a thickened capsule. The liver-cells were greatly altered and degenerated. The yellow crystals above mentioned were present.

CONCLUSION.

(1) The death was *not* caused by malarial coma, although the man had malaria in a chronic form.

(2) The state of the kidney is what, perhaps, might be expected from salvarsan poisoning.

(3) There is some evidence of a recent considerable destruction of blood-cells.

(4) There was nothing in the portion of brain examined to indicate gumma.

NOTES ON THE CASE OF No. 7560, SERJEANT C. S.,
1ST BATTALION, THE SUFFOLK REGIMENT.¹

BY CAPTAIN R. G. ARCHIBALD.

Royal Army Medical Corps.

Service seven years three months. Stationed in Khartoum since January, 1914; previously served in Alexandria. Admitted to hospital on the evening of September 24, 1914. He was a regular beer drinker, but there was no evidence to show that he drank to excess, and also a heavy smoker. He was orderly-room clerk, and had noticed swelling in his legs two months before, but did not report sick until on getting up off his bed he fell down, his legs giving away under him.

On Admission.—Temperature was 103° F. He had symptoms of multiple peripheral neuritis in the legs and some signs of it in the upper limbs. Knee-jerks absent. There were anæsthetic areas over the calves in both legs and in the tips of the fingers; he could not hold or pick up anything. Foot-drop was present. The heart was disordered in action, rate 120, with marked reduplication of the first sound over the mitral area. The muscles were flabby, and tenderness was present in the calf and hamstrings. At first the disease was thought to be alcoholic neuritis with disordered action of the heart due to nicotine.

On October 6 he was worse; both wrist-drop and ankle-drop were well marked, and he had œdema of the legs and back.

On October 12, paresis, pressure tenderness and œdema were more marked; the heart's action was very rapid and a systolic bruit present.

On October 13, the tongue became excessively swollen, so much so as to cause great obstruction in swallowing, and some to respiration; it was incised to relieve the swelling.

On October 14, death occurred from exhaustion.

Post-mortem Examination.—Rigor mortis well marked. Body warm, face, chest, and upper arms deeply cyanosed. Œdema of legs and all dependent parts. Stomach and intestines distended with flatus, ascites about two ounces. No enlargement of liver, but in section well-marked "nutmeg" appearance. Spleen eight ounces in weight, normal in appearance; kidneys normal. Lungs healthy except for œdema, no pleural exudation. Pericardium contained two ounces of fluid. Heart enlarged and dilated, right side distended with black clot. Piece of ileum, liver, sciatic nerve and posterior tibial nerve sent to Wellcome Tropical Research Laboratories, Khartoum, for pathological report.

¹ Extracted from notes by Captain A. P. O'Connor, R.A.M.C., up to September 26, 1914, and by Captain J. F. Farrow, R.A.M.C.(T.) from that date onwards.

PATHOLOGICAL REPORT ON THE POST-MORTEM SPECIMENS OF
SERJEANT C. S., THE SUFFOLK REGIMENT.

The Senior Medical Officer, British Troops, forwarded to these laboratories the following specimens for examination and report:—

- (1) Portion of the liver.
- (2) Portion of the small intestine, in the region of the ileum.
- (3) Portions of the sciatic and posterior tibial nerves.

Microscopical Character of the Specimens.

(1) *Liver*.—The specimen sent was firm and of a deep red colour. On section it presented a mottled appearance and the typical characters of a "nutmeg" liver.

Examination of the cut surface showed minute areas of a deep red colour, which corresponded to the central parts of the lobules, and these were surrounded by zones of a greyish-yellow colour.

(2) *Sciatic and Posterior Tibial Nerves*.—They appeared to be slightly swollen and reddish in colour, but apart from this there were no marked pathological changes apparent.

(3) *Ileum*.—In the lower part of the ileum there were two areas of the mucous surface which showed a well-marked and definite hyperæmia, the centres of which represented minute ulcers with irregular edges. These were adjacent to a Peyer's patch. The peritoneal surface over these areas was slightly congested, but no evidence of perforation was present.

Portions of these specimens were cut into small blocks and placed in various fixing fluids such as formol-alcohol, Schaudinn's fixative, and Orth's fluid, and were finally embedded in paraffin. Longitudinal and transverse sections were cut, and in order to study their histopathology various staining methods were employed.

Liver.—In sections stained by hæmatoxylin and eosin the central vein of each lobule, and the capillaries leading to it, were seen to be dilated and filled with blood. The liver cells between the dilated capillaries were atrophied, distorted and compressed, and many showed a granular appearance and were devoid of nuclei.

In certain areas the liver-cells had undergone complete necrosis. Scattered throughout the liver substance there were homogeneous masses round and oval in shape and of a yellowish colour. They measured ten microns in diameter, and were surrounded by a clear unstained halo which appeared to represent a capsule.

These homogeneous masses showed but little differentiation in structure. Some were found to possess knob-like projections, or buds, on their sides and under surface (fig. 1) and in one case the bud had extended into a thick branching filament along which the clear and unstained halo had extended (fig. 2). This afforded conclusive evidence

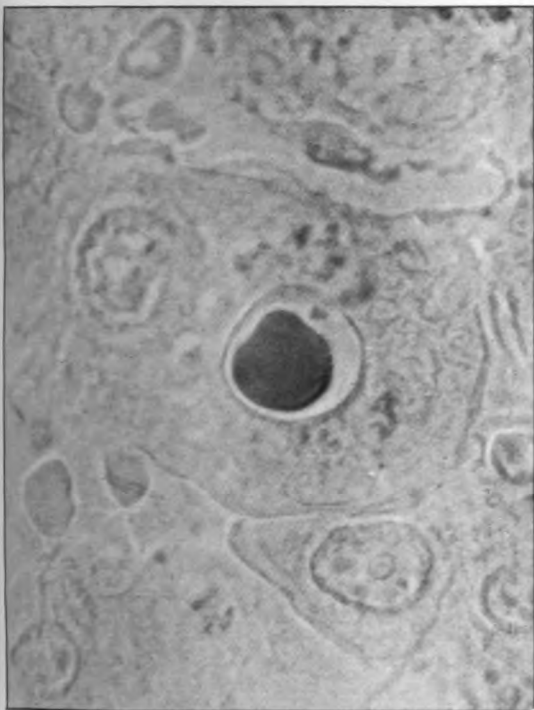


FIG. 1.—Liver, showing homogeneous mass with double contour. Note the projection or bud arising from the side of the mass. $\times 1,700$.

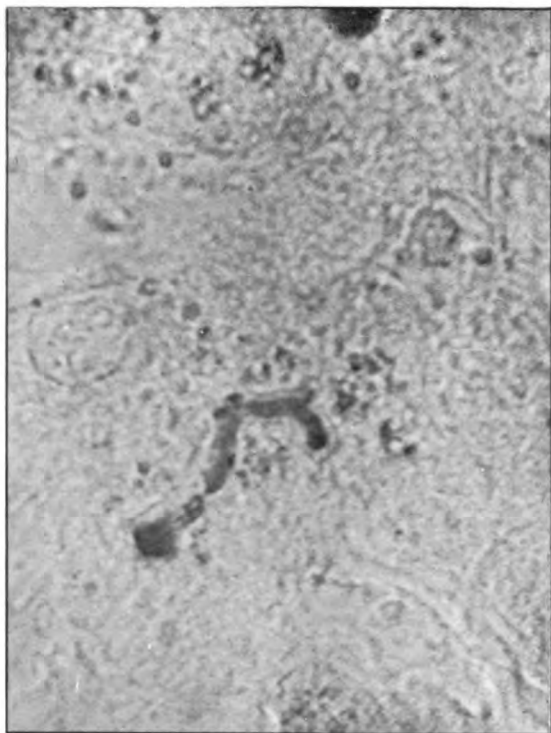


FIG. 2.—Liver, showing thickened mycelial filament arising from a homogeneous mass. Note the branching and the halo continued along the line of the filament. $\times 1,700$.

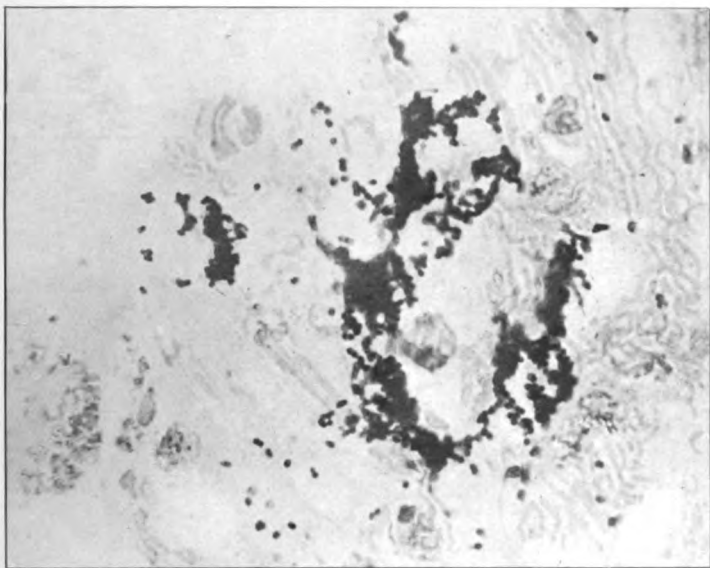


FIG. 3.—Liver showing dense aggregations of spores which assumed yeast-like forms. $\times 310$.



FIG. 4.—Liver. Section of a blood-vessel with branching or budding spores giving a "monilia"-like appearance. These spores are occupying the centre of the lumen of a vessel. $\times 1,700$.

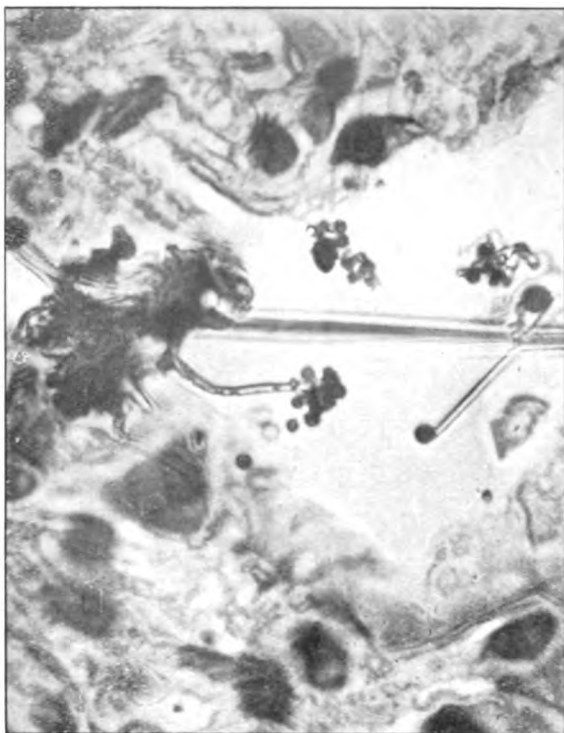


FIG. 5.—Longitudinal section of the ileum in the vicinity of one of the ulcers, showing the fungus *in situ*. Note the hyphae bearing grape-like clusters of spores at its terminal end (acrogenous conidia). Lateral spores (pleurogenous conidia) are also seen. $\times 1,700$.

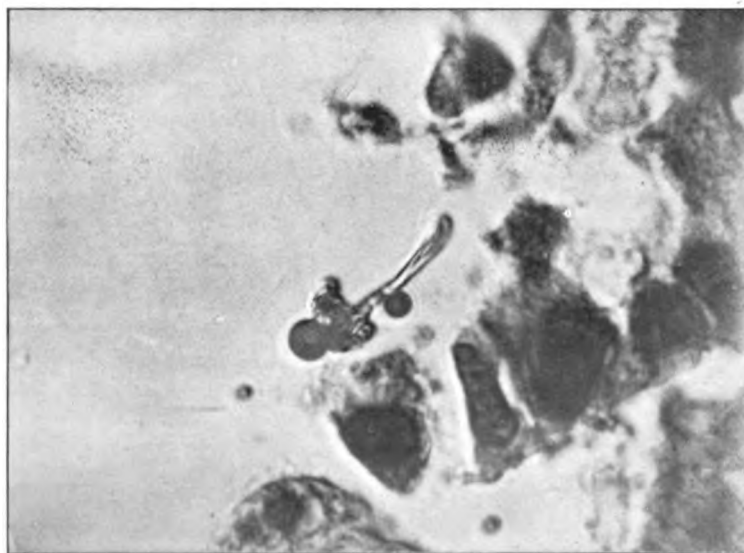


FIG. 6.—Ileum showing a hypha-bearing conidia. $\times 1700$.

that the homogeneous masses were fungal in origin. They were present in the liver-cells, macrophages, and in the lumen of the dilated capillaries.

In Leishman-stained specimens they acquired a greenish-yellow tinge, and by this method of staining it was possible to demonstrate the extensive nature of the infection in the liver.

In Gram-stained sections further elements connected with this fungus were evident, particularly in the areas where necrosis of the liver-cells had occurred. In these areas numerous spores or microconidia were present. They occurred either discrete, or arranged in single chains of two to five elements, or in dense aggregations (fig. 3).

They were round in shape and yeast-like in appearance. They retained Gram's stain, and were provided with a thick wall which enclosed a less intensely stained area in which no vestige of a nucleus or any other structure was apparent. Some of the older forms showed a clear central area with a faintly stained rim.

These conidial elements were small in size, and measured one micron in diameter. Their occurrence in chains apparently resulted from a process of budding (fig. 4). They were located in the liver-cells, and in the lumen of the capillaries and larger vessels, and were also present in the macrophages where they had apparently been phagocyted.

Ileum.—Sections were made in the vicinity of the ulcers. Hæmatoxylin-eosin stained specimens showed that the villi in the affected areas had undergone almost a complete necrosis. Lying in the necrosed tissue were dense masses of fungal elements. They were present in the form of hyphal filaments and conidia, and were recognized by their blackish-brown colour. The density of some of these masses rendered the recognition of the individual elements somewhat difficult, but close to them there were usually found discrete hyphæ bearing acrogenous and pleurogenous conidia (fig. 5). These hyphæ and conidia were also present in the crypts of Lieberkühn and in the submucous tissue. Many of the conidia were lying free or in grape-like clusters, and it was of interest to note their presence in the lumen of the blood-vessels of the submucosa.

The conidia were circular in shape and varied in size from one to six microns in diameter. They were dark in colour but usually possessed a clear pin-point centre. The conidium itself was provided with a double-rimmed envelope which in turn was surrounded by a clear unstained halo.

When the conidia occurred in an acrogenous position they appeared in clusters of two, four, six, eight or more elements "set" on somewhat expanded ends of hyphal filaments (fig. 6). No such intermediate elements as sterigmata were found. In the same manner the lateral conidia appeared to be attached direct to the hyphæ.

The hyphæ were usually non-segmented, and were provided with thick

walls which enclosed a clear interior. Some of the older hyphæ showed segmentation.

There was no very marked cellular infiltration in the vicinity of the fungus. Its presence in the mucous surface of the bowel appeared to excite a necrotic effect. No other organisms were found. Crystals of calcium oxalate were noted in certain parts of the affected areas.

The capillaries of the submucosa were dilated and distended with red blood corpuscles; some also contained conidia.

Nerves.—Longitudinal sections of the sciatic and posterior tibial nerves showed that degenerative processes were present affecting chiefly the medullary sheath of the nerve-fibres.

These degenerative changes were best demonstrated in sections stained by Marchi's fluid, which well illustrated the breaking up of the myelin into a granular mass consisting of fat globules (fig. 7). The inner boundary of the medullary sheath was ill defined. The axial fibres also shared in this disintegration, and in certain areas the nuclei of the neurolemma showed proliferation. In short, the histological changes present were typical of a parenchymatous neuritis.

In transverse sections stained by Gram's method an interesting condition was present in the perineurium. In this area the lumen of several of the blood-vessels was found to be occupied by spores or conidia, indeed, some of them were apparently plugged by thrombi composed of fibrin and conidia (fig. 8). These conidia retained Gram's stain and morphologically were identical with those found in the liver and intestines.

REMARKS.

From the examination of the material obtained there can be no doubt that a systemic infection with a fungus was present, and *ipso facto* it was the *causa causans* of the patient's malady.

The microscopical evidence tends to show that the infection was obtained via the intestinal tract, and that the initial lesion commenced in the ileum in the form of an ulceration set up by the presence of a fungus.

The photomicrographs illustrate (a) the fungus *in situ* in the intestinal lesions; (b) a mycelium and spores of the fungus in the liver; (c) spores of the fungus in the blood-vessels supplying the sciatic and posterior tibial nerve.

Such evidence is sufficiently conclusive to warrant the diagnosis of a "mycosis" being made.

Unfortunately, as the condition was not suspected, neither culture nor animal experiments were carried out to determine the species of fungus present, consequently it was only possible to determine the fungus somewhat arbitrarily from its morphology as seen in the tissues, and more especially in the intestinal lesions. In the latter it appeared to possess

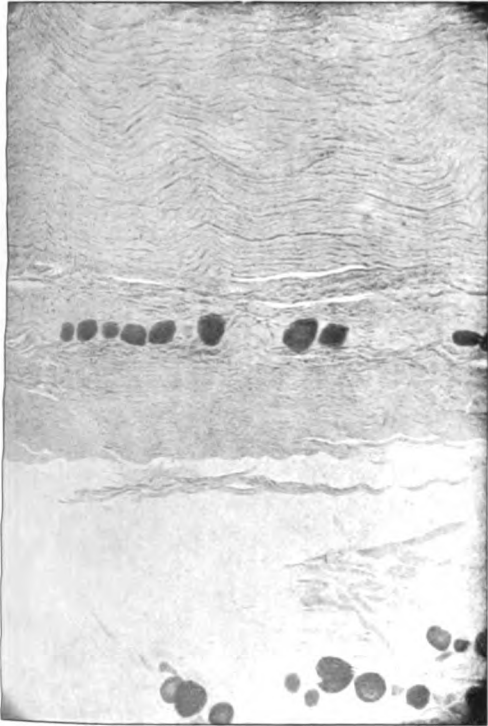


FIG. 7.—Longitudinal section of the sciatic nerve, stained by Marchi's method. The dark areas represent the medullary sheath breaking up into fat globules. The axial fibres have almost entirely disappeared. $\times 340$.

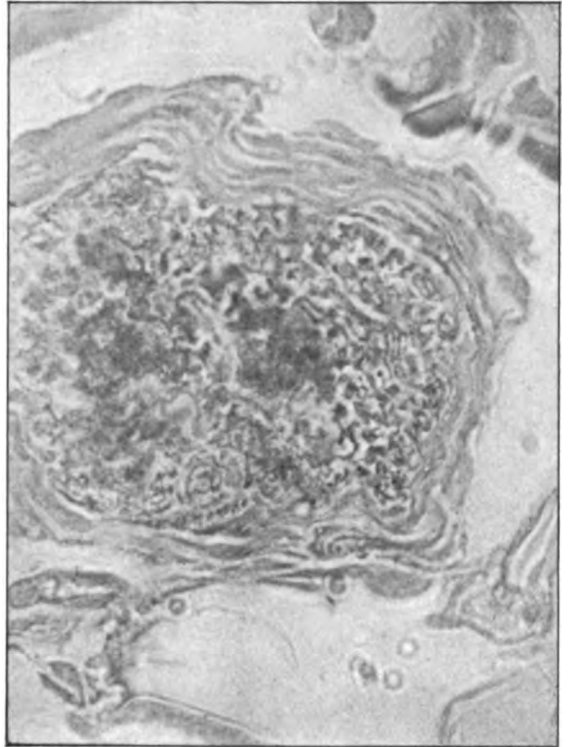


FIG. 8.—Sections of blood-vessel in the perineurium of the sciatic nerve, showing thrombi composed of spores and fibrin. Note that the lumen of the vessel is almost completely occluded. $\times 1,090$.

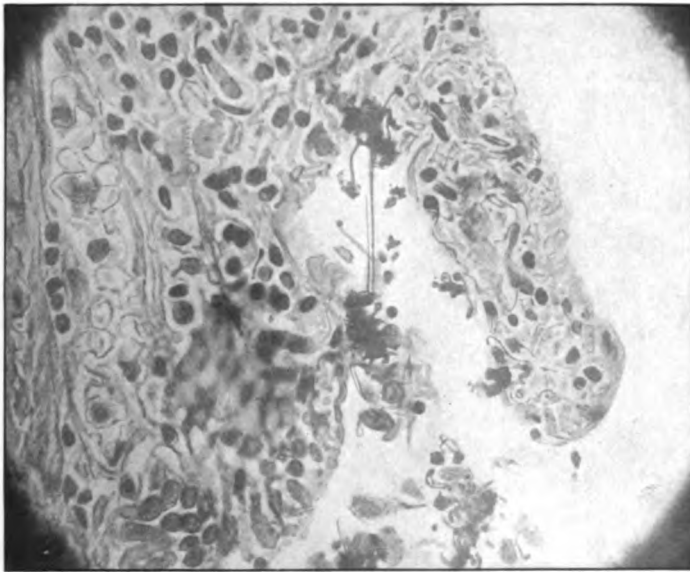


FIG. 9.—Ileum, showing the fungus *in situ* in the base of the ulcer. $\times 620$.

To illustrate "Notes on the Case of No. 7560, Serjeant C. S., 1st Battalion, The Suffolk Regiment,"
by Captain R. G. ARCHIBALD, R.A.M.C.

characters which would allocate it either to the genus *Endomyces* or the genus *Sporotrichum*.

SOURCE OF INFECTION.

The evidence obtained from the examination of the specimens points to an alimentary infection caused by the ingestion of food or water containing the fungus.

Many fungi occur as saprophytes on plants and animals, and it is of interest to note that the genus *Sporotrichum* has been found saprophytic on lettuces and other vegetables used for salads. It is quite possible that the infection in this case may have resulted from the consumption of uncooked, infected or decomposing vegetables, but the question is too hypothetical to be discussed further.

The case appears to be worthy of record inasmuch as it is the first one in the Sudan in which evidence has been obtained of a systemic infection with a fungus. Further, the clinical history of the case and its marked similarity to beri-beri gives additional interest to it. Clinically, the case was typical of beri-beri, and the lesions present in the sciatic and posterior tibial nerves were identical with those found in the disease. The histopathology of the liver and ileum corresponded more or less to that described in beri-beri.

Unfortunately, for reasons already stated, neither animal nor cultural experiments were carried out. They may or may not have afforded conclusive proof.

The theories held regarding the various causes of beri-beri are legion, for the ætiological factor has yet to be determined. In the eyes of most observers the theory that beri-beri is caused by some vegetable parasite apparently carries little weight, but in the writer's opinion more researches are required to definitely rule this theory out of count, particularly in view of the evidence recorded in this case.

Owing to the lack of experimental evidence one may sum up this case by describing it as a mycosis which resembled beri-beri in its clinical and pathological features.

My thanks are due to Captain Farrow, R.A.M.C., Senior Medical Officer, British Troops, for the specimens sent and to Mr. N. Macdonald, Bacteriological Assistant, for the photomicrographs.

NOTES FROM THE CAMPS—SANITARY (SAND AND WATER).

BY MAJOR T. FORREST.

Royal Army Medical Corps (T.F.).

AN outbreak of diarrhoea in two companies of the 16th (S.) Battalion Highland Light Infantry, on December 16, 1914, when ninety men were affected, caused an investigation to be made as to the cause. Complaints as to the quality of the water supply had already been made and the valuable assistance of Dr. R. M. Buchanan, City Bacteriologist, Glasgow, was obtained to examine it. The water was, however, ruled out, as the number of men affected was only a fraction of the whole number using the same water supply. The same process of elimination had to be applied to the food supplies, which are daily inspected and invariably of excellent quality.

In the search for evidence of local contamination it was found that the camp kettles were being scrubbed with sand picked up indiscriminately. Clean sand was provided and orders issued that it only was to be used for scrubbing purposes. Thereafter no further cases occurred.

The ground at Gales has been used yearly for over two decades for camp purposes; refuse pits have been opened and covered over; much traffic, horse and otherwise, has occurred in the vicinity of the drains, and indiscriminate use of sand meant the use of polluted material.

A bacteriological report on the sand in question is appended and valuable suggestions are made by the bacteriologist. The investigation into the water supply is added, as every year complaints are made as to its colour and turbidity especially in wet weather.

A large, more or less permanent, camp has been erected at Gales, which may be further extended, the sandy soil and healthy situation, with ample manœuvring ground in the near vicinity, making this one of the most suitable localities for training purposes. It is desirable that an authoritative statement as to the water supply should be put on record.

REPORT OF THE BACTERIOLOGICAL EXAMINATION OF SAND FROM
MILITARY CAMP AT GAILES.

December 10, 1914.—I, Sand from heap by sump at main drain.
II, Sand from foundation pit in street between A and B line, 2nd Battalion.

Sample I was collected from a small heap which had been used for cleansing food utensils and which presented a soiled appearance. It was examined the same day to determine the nature and amount of bacterial contamination, if any. Sample II was collected from foundation pit for comparison with sample I.

Sand I.

Bacterial Content.—2,060,000 per gramme in gelatine at room temperature; 95,200 per gramme on agar at 37° C.

Colon group (lactose, indol). Details: *Bacillus coli* present in 0·01 grm.; *B. neapolitanus* present in 0·01 grm., absent in 0·05 grm.; *B. coscoroba* present in 0·05 grm.; *B. acidi lactici* present in 0·001 grm.; *B. proteus* present in 0·001 grm.

Sand II.

Bacterial Content.—21,200 per gramme in gelatine at room temperature; overgrown with colonies of mould (mucus).

Colon group (lactose, indol) absent in 1 grm. Details: *B. coscoroba* present in 0·01 grm.; *B. proteus* present in 1 grm., absent in 0·1 grm.

The results obtained from the examination of sand I serve to show the extent to which sand becomes polluted by its use in the cleansing of food utensils. The nature of the pollution indicates that this practice may become a source of dangerous contamination. The danger would be sufficiently guarded against by the use of clean sand from a sand pit placed in boxes. The requisite amount of sand would be lifted out and the possibility of its use a second time would thus be obviated.

(Signed) R. M. BUCHANAN.

Glasgow Public Health Laboratory,
January 25, 1915.

REPORT OF THE BACTERIOLOGICAL EXAMINATION OF THE WATER
SUPPLY OF THE MILITARY CAMP AT GAILES.

First Sampling.

November 30, 1914.—Water supplied to Gailes Camp from Irvine Waterworks.

The sample had been collected at least forty-eight hours previous to examination.

Physical Characters.—The sample contained a deposit of peaty material and filamentous fungi.

Bacterial Content.—70,600 per cubic centimetre on gelatine at room temperature; 28,900 per cubic centimetre on agar at 37° C. Coliform bacilli present in 1 c.c., absent in 0·1 c.c.

The excessive bacterial content was no doubt largely attributable to the interval (forty-eight hours) between the collection and examination of the sample.

The results were reported on December 2, 1914, as indicative of a water requiring careful supervision, and further samples were requested.

Second Sampling.

December 4, 1914.—(a) Irvine; tap at station. Sample taken at 5.30 p.m. (b) Gailes Camp; water standard in front of Army

Service Corps Store. Sample taken at 4 p.m. (c) Water standard at end of lines at parade ground. Sample taken at 4 p.m.

The samples had been collected at least eighteen hours previous to examination.

Physical Characters.—(a) Fairly clear; no sediment. (b) Slight turbidity; no sediment. (c) Decided turbidity; brownish sediment.

Bacterial Content per cubic centimetre.—On gelatine at room temperature (five days), (a) 612, (b) 670, (c) 721; on agar at 37.6° C. (three days), (a) 470, (b) 360, (c) 490. *Bacillus coli* group (lactose, indol) present in 1 c.c., absent in 0.1 c.c. Details of colon group: *B. neapolitanus* present in 1 c.c., absent in 0.1 c.c.

The interval of about eighteen hours between collection and examination of samples (a), (b), and (c) no doubt also contributed largely to their high bacterial content.

The results were reported on December 10, 1914, and on the same date further samples were taken with the view of reducing, as far as possible, this interval of time between the collection of samples and their examination.

Third Sampling.

December 10, 1914.—I, Water tap in Gales Club House. II, Tap in North Parade Ground at T. and S. huts. III, Tap at kitchen of 2nd Battalion.

The samples (each about 6 oz.) were collected at Gales Camp about 4 p.m. and subjected to examination within three hours.

I.

Physical Characters.—Clear; no sediment.

Bacterial Content.—68 per cubic centimetre on gelatine at room temperature; 26 per cubic centimetre on agar at 37° C. Colon group (lactose, indol) present in 100 c.c., absent in 10 c.c. Details of colon group: *B. neapolitanus* present in 100 c.c., absent in 10 c.c.; *B. proteus* present in 100 c.c., absent in 10 c.c.

II.

Physical Characters.—Slightly turbid; no sediment.

Bacterial Content.—154 per cubic centimetre on gelatine at room temperature; 52 per cubic centimetre on agar at 37° C. Colon group (lactose, indol) present in 100 c.c., absent in 10 c.c. Details of colon group: *B. neapolitanus* present in 100 c.c., absent in 10 c.c.; *B. coscoroba* (or *B. cloaca*) present in $\frac{1}{2}$ c.c.; *B. proteus* present in $\frac{1}{2}$ c.c.

III.

Physical Characters.—Clear; no sediment.

Bacterial Content.—152 per cubic centimetre on gelatine at room temperature; 36 per cubic centimetre on agar at 37° C. Colon group (lactose, indol) present in 100 c.c., absent in 10 c.c. Details of colon group: *B. neapolitanus* present in 100 c.c., absent in 10 c.c.; *B. coscoroba* present in 10 c.c., absent in 1 c.c.; *B. proteus* present in 10 c.c., absent in 1 c.c.

The results of this third sampling may be taken as being fairly indicative of the actual condition of the water. Sample I as representing the delivery from a tap in more or less constant use for some considerable time, was taken for the purpose of comparison with II and III.

The bacterial content of the three samples qualitatively is very nearly alike, but quantitatively is about doubled in samples II and III as compared with sample I. Bacilli of the colon group (lactose, indol) are present in 100 c.c. but not in 10 c.c., but the detailed results under this group show the absence of true *B. coli* in 100 c.c.

CONCLUSIONS.

Owing to the interval between the collection and examination of the *first and second samplings* the numerical results have no value beyond indicating (1) the possibility of rapid multiplication of bacteria if the water is allowed to remain for any length of time in the end pipes, and (2) the need for systematic flushing of those standard taps which are not much in use.

The results of the *third sampling* may be interpreted as indicating a fairly pure upland supply when local conditions and circumstances are fully taken into account. At the same time it must be stated that the total number of bacteria per cubic centimetre and the colon group content are comparatively high and point to some contamination, which although not presenting evidence of a specifically dangerous nature is undesirable, and most probably preventible. It is of a nature that suggests pollution of the reservoir by the intermittent visits of sea birds.

(Signed) R. M. BUCHANAN.

Current Literature.

The Annual Report on the Health of the Bavarian Army, October, 1910—September, 1911.—The average annual strength of the Bavarian Army during the above period was 66,816 and the sick rate was 427·3 per 1,000. This compares favourably with previous years :—

1909-10	..	..	..	..	..	445·1	per 1,000.
1908-09	..	..	..	..	..	472·8	„

Quinquennium :—

1903-04—1907-08	..	..	..	..	..	626·2	per 1,000.
1898-99—1902-03	..	..	..	..	..	923·9	„
1893-94—1897-98	..	..	..	..	..	1,028·9	„

The sick-rate in the Prussian Army for the year under report was 591 per 1,000.

The sick-rate for men in the first year of their service was 572·8 per 1,000 as compared with 292·7 per 1,000 of men in their second year of service.

The average daily sick-rate was 21·4 per 1,000. The average number of days under treatment was 17·8 days.

The average number of days absent from duty on account of illness for every man in the army was 7·8 days of which 5·5 days are debited to hospital and 2·3 days to barrack hospital treatment.

Admission rates per 1,000 for some of the various groups of disease were as follows :—

Infectious and general diseases	..	..	..	..	31·7
Respiratory diseases	..	..	..	..	52·9
Diseases of the digestive system	..	..	..	..	67·8
Venereal diseases	..	..	..	..	16·5
Skin diseases	..	..	..	..	73·1
Injuries	..	..	..	..	85·9

The death-rate was 1·9 per 1,000 of the total strength.

The total number of deaths was 130 ; of these 81 were due to disease, 28 to accidents and 21 to suicide. Enteric fever : only four cases occurred with 2 deaths. Hernia : 133 cases = 2 per 1,000. Operation performed in 121 cases ; 69·1 per cent returned to duty ; 25·2 per cent dismissed ; the majority of the cases were in the infantry. Average number of days under treatment 25·6.

Appendicitis : 273 cases = 4·1 per 1,000 of strength ; 70·3 per cent returned to duty ; 3·4 per cent died ; 20·9 per cent dismissed. Average number of days under treatment 35.

Venereal disease : 1,104 cases = 16·5 per 1,000, of which 295 cases or 4·4 per 1,000 were due to syphilis ; 88·9 per cent returned to duty. The admission rate for the quinquennium : 1904-05 to 1908-09 was 15·4 ; 1889-90 to 1893-94 was 34·9.

Of 30,017 recruits called up for service in the autumn of 1910, 107 = 3·6 per 1,000 were suffering from venereal disease.

If these men who joined with venereal disease and the relapse cases are excluded from the returns, then the actual admission rate for first infections during the period of military service drops to 13·9 per 1,000.

The diagnosis of gonorrhœa was always made either by staining or by cultural reactions.

Cases were considered cured when they complied with the following conditions :—

- (1) Complete absence of visible discharge in the morning.
 - (2) The urine clear and free of threads at all times of the day.
 - (3) When the examination of mucous membrane of the urethra and the prostatic region by means of a sound revealed nothing abnormal.
 - (4) When smears taken from the urethra by means of platinum wire showed no gonococci or pus cells.
 - (5) No reaction after drinking beer, exercise or irritating injections.
- There is nothing special in the report about treatment.

Gunshot wounds : there were thirty-three cases altogether, including the suicides.

Sanitary improvements : a long list of structural alterations in barracks, and various sanitary improvements effected during the year are also given in the report.

J. V. F.

The Comparative Mortality of Disease and Battle Casualties in the Historic Wars of the World.—The above is the title of the Seaman Prize Essay written by Captain Louis C. Duncan, Medical Corps, United States Army, and which has been published in the March-April, 1914, number of the *Journal of the Military Service Institution of the U.S.A.*

He deals with the subject from the earliest times, and the essay is divided roughly into a pre-medical era up to the year 1700, an era of medical organization 1700-1810, and a subsequent sanitary era.

War	Battle death-rate	Disease rate	Ratio	MORTALITY	
				Wounds	Sick
				per cent	per cent
Irish, 1689	—	450	—	—	50
Walcheren Expedition, 1809	5	200	1 : 40	—	50
San Domingo, 1802	—	500	—	—	50
Peninsular War, 1808-14, Br. ..	42	118	1 : 3	10	14
Russo-Turkish, 1828-29, Russian ..	—	500	—	—	25
Mexican, 1846-48, American	15	110	1 : 7	12	—
Italian, 1859, French	112	51	2 : 1	17·3	—
Crimean War, 1854-56, English ..	69	230	1 : 3	16	17
French	70	341	1 : 5	25	33
Russian	120	263	1 : 2·2	19	23
American Civil War, 1861-65	33	65	1 : 2	14·6	3
Confederate, estimated	47	94	1 : 2	—	—
Russian War, 1877-78, Russian	25·8	99	1 : 4	12	6·6
Spanish War, 1898, American	4·6	25·7	1 : 5·6	4·6	8·6
Franco-Prussian, 1870, German	55	24·5	2 : 1	11	5·8
French	67·5	140	1 : 2	15	25
Anglo-Boer, 1899-1901, English	12·5	25·5	1 : 2	8·8	3
Russo-Japanese, 1904-05, Russian ..	35	13·5	2 : 6·1	4·19	2·7
Japanese	54	25	2 : 1	6·6	6·6

In order to compare losses from different causes, in different places and at different times, the writer has throughout reduced all losses to a basis of 1,000 men in service one year.

Reliable statistics date from the nineteenth century only and the preceding table shows the ratio of deaths in battle and from disease in various campaigns.

A prolonged and careful study of history and reference to many works have been necessary to compile this very able and interesting article.

Investigations with regard to Metabolism which takes place during Starvation, and Lessons to be deduced therefrom (*Untersuchungen und Erwägungen über den Hunger*).—In a lecture delivered by Professor Dr. Arthur Schlossmann to the Lower Rhine Army Medical Society on November 26, 1913, and reproduced in the *Deutsch. Med. Zeitsch.*, March 5, 1914, the lecturer, who is the director of a children's hospital in Düsseldorf, stated that he has made a prolonged study of the subject in infants and is of opinion that with the ever increasing knowledge of the physiology and pathology of metabolism in infants some new light may be thrown on the subject as regards adults.

The infant confined to its cot is a most useful subject for investigation for it can remain constantly under observation.

He has carried out many interesting experiments with infants with regard to expenditure of energy, heat production, etc., and which he detailed at some length in this lecture.

With regard to the hunger experiments, he is of opinion that the infant is a far better subject for investigation as compared with the professional starver or the investigator who experiments on himself and whose enthusiasm may blind him as to the actual state of affairs.

The lecturer maintained that the withdrawal of food from the infant is unattended by suffering, provided the normal quantities of fluid are administered. Only healthy infants were used in the tests. To carry out his experiments he first accustomed the infants to the bottle, measured feeds of human milk being administered at regular intervals and at a definite temperature. As soon as the infant was accustomed to this it was given a 0.3 per cent NaCl solution with an admixture of saccharine instead, and it never appeared to know the difference between the saccharine solution and the real milk diet. He quotes the case of a fine healthy baby who was the subject of several different experiments. When it was on a nutritious diet it used to cry when a meal was due and it cried again when the meal was over to show its regret that the happy moment was over. Its behaviour when under saccharine treatment was exactly similar. It was practically the same with the other infants. It was only on the third day that they showed signs of diminished activity.

In the first forty-eight hours there is practically no change in metabolism. It is of course different under conditions of violent physical exertion, e.g., in forced marches, etc., where the amount of glycogen used up is much greater from the beginning and the reserve accordingly is soon expended. The question of fatigue in the lecturer's opinion is closely connected with the exhaustion of the glycogen supply in the body.

The destruction of protein in hunger can be estimated by the amount

of nitrogen to be found in the urine. In experiments on adults and animals, twelve to eighteen hours after the last meal the quantity of nitrogen excreted is found to be diminished; this continues *pari passu* with the diminution of body weight until near the end of the collapse of the individual when the quantity of nitrogen again increases. With regard to the experiments on infants, there was often a small increase in nitrogen excretion on the second or third day. This indicates an increased amount of protein reduction at the moment the available glycogen bodies are becoming exhausted. The process of protein reduction differs in the starvation of children who have been naturally fed as compared with those who have been artificially fed. Artificially fed children react in the same way as adults or animals which have been experimented on, that is to say, the excretion of nitrogen is diminished. It is the other way about with the breast fed infant. The reason for this is that the human milk contains only a small quantity of protein. Its nutritional value lies in its fats and carbohydrates and this goes to show that a large quantity of albumen is not requisite for the maintenance of the human body.

This should be borne in mind when calculating food values, because one is always apt to place too much stress on protein values.

As soon as the naturally fed individual begins to starve, that is to say, one who is accustomed to a diet rich in fat and carbohydrate but with a small amount of protein, he begins to live on his tissues. The breast-fed child when starved secretes much less nitrogen than the artificially fed child. The important lesson to be drawn from these facts is that the man who accustoms himself to a diet rich in protein will suffer more under privation than the man who has been accustomed to a diet containing just a sufficiency of protein for his requirements without excess.

By experimental feeding various changes in metabolism can be induced. By over-feeding with certain food-stuffs the organism can become accustomed to consume less glycogen or less fat. For instance, a dog fed on lean meat and rice for three days still provided for his energy expenditure to a large extent by using up its glycogen reserve.

Other important changes take place in starvation; the combustion changes in the tissues no longer reach the higher stages of oxidation, and the blood becomes loaded with acetone and B-oxybutyric acid which involves an increased excretion of these substances. The formation of these is dependent on the deficiency of carbohydrate, and of protein which becomes reduced. The formation of these substances can be influenced by inducing relative instead of absolute hunger by exhibiting carbohydrates at any rate.

This was done with the infants experimented on. No albumen or fat was given, but instead of the saccharine solution a sugar lactose solution was administered. The destruction of protein during the administration of the sugar solution was just as great as during absolute starvation but there was no acetone or B-oxybutyric acid in the urine.

In absolute starvation the quantity of acetones formed is lessened if only small quantities of protein are reduced but increased if more of the protein of the body is used up. A naturally fed child which is starved for two or three days, uses up less protein and lives on its tissues less than a previously artificially fed child. At the same time, the child at the

breast during starvation forms less acetone and B-oxybutyric acid. In the same way the soldier, who is accustomed to a diet without excess of protein, and who has to go without food for two or three days will use up his tissues less than the man who consumes a protein rich diet; the former will also form less acetone and B-oxybutyric acid.

With regard to the total metabolic changes in the starved infant: the child experimented on, which had been accustomed to a rich diet, developed, after starving for twenty-four hours, 891 calories per square metre of body surface. After forty-eight hours there was no further change; the average of two well-conducted experiments was 895 calories. On the third day, however, it sank to 787. The expenditure of energy on the third day was lessened presumably by reduction of general movements, that is to say, the child was endeavouring to prevent the loss of tissue by not expending its energy in unnecessary movements. In the same way with troops, after forty-eight hours' starvation, they will become exhausted, and physical exhaustion is liable to prevail over will power.

Treatment of Tetanus.—E. E. Irons (*Journal of Infectious Diseases*, September, 1914, p. 372) has studied 225 cases of tetanus treated with antitoxin. The mortality of tetanus varies inversely with the incubation period. Permin and Faber found that the deaths in 94 cases of tetanus treated without antitoxin in which the incubation period was ten days or less amounted to 94·7 per cent.

In those to whom anti-tetanic serum had been given, the mortality was 72·8 per cent of 92 patients in whom the incubation period had been ten days or less, and 40·4 per cent of 57 cases in which the incubation period had been more than ten days.

Permin in his analysis of the Denmark statistics has ascertained that the mortality of 199 cases treated without serum was 78·9 per cent as compared with 57·7 per cent of 189 cases which received antitoxin.

The mortality of the 225 cases treated with serum which were investigated by Irons was 61·77 per cent. That of 21 cases to which antitoxin was not administered was 85·7 per cent.

Intravenous or intraspinal injections of antitoxin are necessary since immediate treatment is essential; and if the serum is given subcutaneously, the maximum concentration of the antitoxin in the blood is not reached until the end of the second day. Of 82 patients treated with over 3,000 units of tetanus antitoxin subcutaneously, and 3,000 units or less intraspinally or intravenously, 57 per cent died. But of 42 treated with 3,000 units or less subcutaneously 73·7 per cent succumbed. Moreover animal experiments indicate that intraspinal injections should be employed in all cases of tetanus. Irons reports the use of intrarachidean injections of magnesium sulphate in 18 cases; all but 4 died. Death was caused in 2 by paralysis of the respiration shortly after the injection.

Irons concludes that the prophylactic value of tetanus antitoxin is established. The mortality of tetanus treated with tetanus antitoxin is reduced by about 20 per cent below that of untreated cases.

It is imperative that on the first onset of tetanic symptoms 3,000 to 5,000 units of antitoxin should be immediately introduced into the spinal canal, and 13,000 to 20,000 units into the veins.

The intraspinal injection must be repeated next day, and on the

fourth or fifth day 10,000 units should be given hypodermically. There must be no delay in the surgical interference at the site of infection. Large doses of chloral or chlorbutanol are necessary to control the spasms.

C. B.

Report to the Local Government Board upon the effects of certain Condensing and Drying Processes used in the Preservation of Milk upon its Bacterial Contents, by Dr. S. Delépine. (FOODS REPORTS, No. 21.)

IX.—General Summary.

(1) The total number of bacteria present in mixed cows' milk, such as is usually supplied to town consumers,¹ has been found to be considerably reduced by treatment according to each of the three methods investigated. The reduction was greatest in the case of Method A (manufacture of sweetened condensed milk), and least in the case of Method C (drying of milk sprayed in a current of hot air). Method B (drying of milk over heated revolving cylinders) occupied an intermediate place.

(2) In each of the three methods of treatment there was a stage at which the reduction in the total number of bacteria was much greater than that observed in the finished article ready for sale.

(3) The increase in the number of bacteria observed during the final stages is due to *recontamination*.² By recontamination I mean the results of the exposure of a product partly or completely sterilized, to sources of infection by which some of the bacteria removed by sterilization are reintroduced.

(4) The reduction in the total number of bacteria was almost entirely due to the death of streptococci, staphylococci, sarcinæ, bacilli of the *Bacillus coli* type, streptothrichæ, yeasts, etc.

(5) At none of the stages of preparation was the milk ever found completely sterile. The amount of heat to which the milk was submitted was insufficient to bring about the death of several saprophytic and of some pathogenic bacteria.

(6) Among the saprophytic bacteria, which were invariably found to resist pasteurization, those most commonly detected were sporing bacilli of the types included under the term *B. mesentericus*. Some streptothrichæ appeared in some cases to have survived, but the evidence on that point was not conclusive.

(7) Of the pathogenic bacteria, the tubercle bacillus was the only one the fate of which was investigated. Some living tubercle bacilli of bovine

¹ That is, milk in which extraneous bacteria have generally had the opportunity of multiplying to various extent.

² In fixing *bacterial standards* for preserved milk this fact should be kept in mind, for it is clear that by the exercise of proper care *recontamination* might be almost entirely prevented. If this were done the total number of aerobic bacteria, cultivable by the methods indicated in this report, should seldom exceed one hundred per gramme of preserved milk.

origin were found to have survived treatment according to method B.¹ It may be safely assumed that Method C, which yields a product giving a higher total bacterial count than Method B, has even less effect upon tubercle bacilli. The same bacilli resisted the process of pasteurization which forms part of Method A.

(8) The tubercle bacilli which had survived pasteurization in Method A and drying by heat in Method B, were still capable of producing progressive tuberculosis in guinea-pigs inoculated subcutaneously with milk containing these bacilli, but the course of the disease produced by these bacilli was very much slower than that of the disease produced in guinea pigs inoculated with the same amount of untreated tuberculous milk. The tuberculosis produced by the heated bacilli was *latent* or *occult* for some four weeks.

Young rabbits fed with milk containing these modified bacilli did not contract tuberculosis.

¹ I am aware that the above conclusions, except those relating to feeding, do not agree with those arrived at by other observers in the United States and in Germany. Thus, Dr. W. Hoffmann, of the Kaiser-Wilhelm Akademie, is reported to have stated that he had proved by experiments that the *bacilli of bovine tuberculosis which may be present in liquid milk are killed by one of the methods of drying milk tested by us*. Whether the difference between his results and mine is due to a difference in the original number of bacilli, to a difference in the characters of the milk treated, or to the way in which the process was carried out, I cannot say, but the precautions which I have taken to avoid accidental contaminations entitle me to say positively that under the conditions which I have detailed in this report sterilization was not complete.

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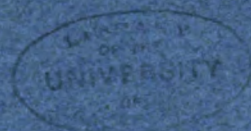
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MEDICAL NARRATIVE OF THE ARRANGEMENTS OF
THE FIRST DIVISION AT THE BATTLE OF THE
AISNE.

BY COLONEL G. CREE, C.M.G.

PRELIMINARY REMARKS.

BEFORE starting on the actual medical narrative of the arrangements of the 1st Division at the Battle of the Aisne, I should like to give you an idea of the routine method we employed in the use of the medical units. The Division on the march was always arranged into three brigade groups and a headquarters group. The brigade groups consisted of the infantry brigade, an artillery brigade and the ammunition column, and sometimes also the brigade company of the train; the headquarters group, of the Divisional Headquarters, the divisional mounted troops and cyclists, the signal company, and the heavy battery—sometimes also the howitzer brigade. To meet this arrangement, and carry on the idea, each field ambulance marched with a brigade group, and billeted and drew rations with it. This was a convenience from the point of view of billeting and feeding, and had the additional advantage of always indicating where each of the field ambulances was, and preventing them from getting mislaid. When in touch with the enemy the arrangements were modified, and the bearer divisions alone, with a proportion of their ambulance wagons, marched with their brigade groups, the tent

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divisions marching and billeting with the baggage sections of the train. After experience with varying conditions we came to the conclusion that this was on the whole a very good routine arrangement—it saved a good deal of order writing, and enabled us to put our fingers at once on any portion of the field medical units.

TOPOGRAPHY OF THE AISNE.

The portion of the Aisne Valley over which we operated is about two miles wide and contains the river as well as the canal of the same name, which run side by side and nearly west and east in direction, and is protected on each side by high, steep ranges of hills, throwing out numerous spurs with deep re-entrant valleys running up to the scarp of the main ranges. There are good main roads running parallel to the river and canal on each side, with branch roads at right angles to the north and south. The river and canal were crossed by numerous bridges, the majority of which, however, have naturally been destroyed. The valleys and spurs were well wooded, and cultivated land formed the rest of the ground.

On the morning of September 13, the 1st Division marched from its billets at Bazoches and Vauxcercé about daybreak. The bearer divisions accompanied their brigade groups. The tent divisions remained with the divisional train. About midday we reached the Aisne itself, without practically any opposition whilst crossing the range of hills south of the river, and found the bridge at Bourg had not been destroyed by the Germans for some occult reason or another. The Division crossed by this bridge with practically no opposition, except shell fire, and billeted in the village of Bourg that night. Nothing of importance had happened during the day from a medical point of view, and the bearer divisions billeted in their brigade areas.

On the following morning, the 14th, the Division marched at daybreak, the 2nd Brigade acting as advance guard, along the main road running at right angles to the river to Laan over the crest of the hills. About one and a half miles along this road they came in touch with the enemy about 6 a.m., and a general action started. The brigade pushed along the road to north of Vendresse and Troyon and took up a position on the crest of the hill south of the famous Chemin-des-Dames which runs practically east and west. The bearer division of No. 2 Field Ambulance, which was accompanying the 2nd Brigade, opened a dressing station on the

right-hand side of the cross roads Vendress-Moulins in a small farm. The 1st Brigade moved up on the left of the 2nd Brigade, and the 3rd Brigade—less the Queen's Regiment—on the left of the 1st, the Queen's moving to the right of the 2nd Brigade into Paissy. The bearer divisions of Nos. 1 and 3 Field Ambulances conformed to the movement of their brigades and also opened dressing stations, No. 3 in Vendresse at the Marie and other buildings, and No. 1 at Moulins in a farm. The Division was now extended along a front of about three miles, from Chivy on the left to Paissy on the right. The artillery were spread out behind this line, some batteries in the Chivy Valley, some below Moulins, and some at Paissy. The villages of Chivy, Beaulne, Troyon and Paissy, were all utilized by the Regimental Medical Officers as first-aid posts, and owing to the nature of the ground these officers were able to work in close touch with those of the bearer divisions. The headquarters of the Division remained just off the main road about a mile south of the cross road to Moulins.

About 12 noon we visited all the dressing stations and found them working well. The casualties were coming in very rapidly as the fighting was very severe and the dressing stations, and the roads leading to them, were all under shell fire. During the forenoon all three tent divisions reported their whereabouts by means of either a mounted officer or cycle orderly, near Vauxcere, in the following order on the road, Nos. 1, 3 and No. 2, and they were given orders to move on to Bourg and report their arrival. At 3 p.m. we got a message from 1st Corps to say that an ambulance train would be at Bazoches that evening. The problem that now confronted us was what was best to do with the tent divisions of the field ambulances. We anticipated a large number of wounded and the bearer divisions would not be able to cope with them without getting unduly congested and overstrained. Owing to the condition of the roads, under constant shell fire with both shrapnel and high explosives, the communications to the rear in daytime would be hazardous. So it was decided to push the tent divisions of Nos. 1 and 3 up to their bearer divisions and let them work together, and messages to this effect were sent to the tent divisions concerned, and the bearer divisions were also informed. The tent division of No. 2 was ordered to remain on the south side of the river and open a divisional collecting station for the whole of the wounded pending their removal back to a château in the village of Villers. Nos. 1 and 3 arrived between midnight and 1 a.m. and moved up to their positions; No. 1 to Moulins and

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No. 3 to Vendresse, where they took over a comfortable château. The next morning, the 15th, at 6.45 a.m., an early visit was paid to all the dressing stations. The tent divisions which had safely arrived during the night were opening up. All were more or less under shell fire and so were the roads communicating with them. The casualties were accumulating rapidly and we estimated them to be already between 900 and 1,000, so it was obvious that evacuation must be begun as soon as possible or there would be clogging. Having heard from the General Staff that the position was likely to remain stationary for a time, orders (verbal) were given to all to begin evacuating by starting convoys of ambulance wagons containing sitting cases, accompanied by walking ones. No. 2 Bearer Division, which still remained in its original position, began at 8.30 a.m. to carry this out, but had an unfortunate experience, for while doing so a high explosive shell fell outside the building, killing two Royal Army Medical Corps men as well as the wounded man they were carrying. The horses stampeded, as did also the walking wounded, but we were able a few hundred yards down the road to reorganize them all again and put them under a wounded officer with directions to proceed to No. 2 Tent Division at Villers. This convoy consisted of four wagons and a hundred cases walking, and was indeed unfortunate as the enemy followed it down the road, till it got out of range, with shell fire, fortunately doing no further damage, but the feelings of that convoy must have been very unenviable for the first part of their journey. At 10 a.m. we visited all the dressing stations again and found Nos. 1 and 3 in process of getting their convoys ready. These various convoys were despatched as opportunity occurred, and all of them reached their destination without any further mishap. Fortunately we had found that two temporary bridges over the river and canal built by the Germans at Villers had not been destroyed by them, which gave us a second and more secure road. At 12.30 p.m. we visited the divisional collecting station at Villers and found cases coming in in great numbers, so that there was a risk of clogging there also. Orders were sent to Nos. 1 and 3 Field Ambulances to each send two medical officers to help out the work. We were dependent at that time entirely on the lorries of the divisional supply column to evacuate our wounded, and it was obvious that these vehicles on the following day would not be sufficient to deal with the numbers we should have accumulated. About three hundred cases could be cleared that afternoon by the column, which was done to the ambulance train at Bazoches.

For the following day's arrangements the A.A. and Q.M.G. was seen and it was suggested that the French should be asked to help as it was known they had a large number of motor buses available and some motor ambulance wagons. This was left for our liaison officer to see through.

During the afternoon a message was received that there were many wounded lying between the two lines of fire. The General Staff were consulted as to the collection of these, and we were told that no attempt should be made to collect farther forward than our outpost line, as it would only result in further loss of life. A message from the 3rd Brigade was also received saying that many wounded had accumulated at Beaulne and Chivy. The message was repeated to Officer Commanding No 3 Field Ambulance with directions that these should be cleared at night direct to Villers.

The dressing-station of No. 2 Bearer Division was now being so heavily shelled that it was untenable and most dangerous, so orders were sent to them to move up into Vendresse, where they would be more under the protection of the high ground.

On the following morning, the 16th, all the dressing stations were visited and found to contain many wounded, although between 500 and 600 had already been evacuated to Villers, but it was evident that every effort would have to be made to keep the out-flowing stream equal at least to the constant flow inwards. The difficulty was the shell fire, and it was only at night that wagons could proceed along these roads without risk of severe casualties. So it was decided to utilize all the thirty ambulance wagons of the division in the form of a convoy to travel from dusk till dawn backwards and forwards between the dressing stations and the divisional collecting station—a distance of about four miles—and to keep the casualties at the latter place till the afternoon following, when they could be removed in the supply lorries; and I may say this arrangement held good for the whole of our stay in this neighbourhood.

In the early afternoon we visited the divisional collecting station at Villers and found evacuation from there was proceeding satisfactorily. In addition to the twenty-seven lorries of the divisional supply column, the French had sent us twenty motor buses and ten motor ambulances. The Royal Flying Corps had lent us six lorries, and the 1st Cavalry Division about ten. All, with the exception of the motor ambulance wagons, were utilized to clear the divisional collecting station, and by this means the place was practically emptied that afternoon. The lorries were to go to

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Fère-en-Tardenois, about sixteen miles, which was a rail-head, and the French buses to Braisne, about eleven miles, where a clearing hospital had now been opened. The ten French motor ambulance wagons were taken back to Chivy to try and empty that place. It was a poor spot, difficult of access and exposed to fire, but the only available place in the immediate neighbourhood. As we had been informed by the General Staff that a general bombardment of the German position would take place at 5 p.m., it was decided not to proceed with the clearing of Chivy till night, but the enemy did not reply, so the convoy started from there at 6 p.m. and arrived at Villers without mishap. We now received notice that another ambulance train would be at Bazoches, six miles away, that evening, so the convoy was diverted there.

On the morning of the 17th, the usual early morning visit was paid to the dressing stations and it was found all was going well, except the clearing of Chivy and Troyon, in which latter place No. 1 Field Ambulance had now established a detached post, which was difficult of access, by narrow, hilly roads, very exposed, and subject to shell fire.

At 9 a.m. we started off for Villers and on the way met the Sous-officier of the French motor transport with the bad news that he was to take the whole of his transport to Reims by 2 p.m. However, on arrival at the divisional collecting station we found this transport all loaded and we were able to persuade the Sous-officier to make one journey to Braisne before leaving us altogether. That journey ended our connection with the French motor column, but we can never be thankful enough to them for their very timely help, for with their aid we were able to clear from the Division no less than 1,500 wounded in two days.

From now onwards matters began to settle down into an orderly routine. The nightly convoy of horse wagons from Villers to the dressing-stations, and the daily clearing of Villers to Braisne by means of the supply column, were the leading features of our arrangements. The numbers of daily wounded gradually decreased, with, of course, occasional exacerbations due to our enemy's bursts of activity, till on the 18th we were able to take away the tent divisions of Nos. 1 and 3 Field Ambulances from their forward positions and place them in reserve in Villers. On the 19th the bearer division of No. 2, which was still in Vendresse, was ordered back to its tent division at Villers, so now all that remained in front were the bearer divisions of Nos. 1 and 3, somewhat augmented as regards personnel. Chivy and Moulins had been given up and

Paissy was sending their few cases direct to Villers. On the 20th a sudden activity on the part of the Germans produced an influx of wounded into Troyon, where the caves in the hillside were now being used as a dressing-station, and into Paissy, and special efforts had to be made to clear them. As regards Troyon this was accomplished, but the road to Paissy was so severely shelled that we were unable to effect our object until the middle of the night. Troyon to the end always remained a thorn in our side: narrow, difficult roads, very exposed in the daytime, and most trying at night, made us determined, in spite of the comfort and security of the cases, to give it up on the first opportunity and maintain the Chateau at Vendresse as the sole dressing-station. On October 2, orders were given for the bearer division of No. 1 to clear out of Troyon and arrangements were made for a detachment from No. 3 at Vendresse to take their place, with a view of giving the place up altogether. We were never able to do so, however, and till the end were obliged to keep our detachment there. As regards Paissy the 1st Cavalry Division, which was assisting the 1st Division, and which had kept a detachment of one of its field ambulances there, had dealt with the casualties, which previously had been few. About the 19th this detachment had been withdrawn and we had now to arrange for that place. This was done by sending a small detachment from No. 1, with an officer to stay there and evacuate direct to Villers.

On September 19, the 18th Brigade joined the 1st Division, and by this means the other brigades were in turn taken out of the trenches, and we were able to effect some very necessary measures of cleaning and anti-typhoid inoculation which we had much wanted to do. Sanitary inspections were continuous, and I believe that to the day we left our trenches could be described as all that could possibly be expected. There was one matter that troubled us very much, and that was the inability to render aid to our men who were badly wounded between the two lines of fire. On many occasions we spoke about this to the General Staff, but it was always decided that it was impossible except at the cost of many lives, so it had to be given up.

On November 1, orders were received for the Division to extend its area to the left to take in a portion of the area which had been covered by the 2nd Division. This necessitated opening another dressing-station, which was done at Verneuil by the bearer division of No. 2, which sent its wounded direct to Villers.

From now till preparations commenced for the move of the

Division to another sphere of action, our work became practically one of routine. I do not mean that there was nothing more to be done, but the collecting and clearing of our casualties now went along without needing any re-arrangement. In this respect I should like to note the obligations we were under to the D.A.Q.M.G. and the Officer Commanding the divisional supply column. Their ever kindly help and consideration, in always placing the lorries of the column at our disposal and in helping us in many other ways, were great factors in the smoothness of the medical arrangements. We were also now able to carry out further anti-typhoid inoculations, and before leaving the Aisne had managed to do the majority of the Division. The re-fitting and arranging of the field ambulances could now be done, and before we left these units were able to complete their establishment of horses, and fill up all their deficiencies of material. In fact, far from being an easy time it was a very busy period for the A.D.M.S. and his deputy. Daily visits to Corps Headquarters, visits to Rail-head, the Clearing Hospitals, Advance Depôts of Medical Stores, Ambulance Trains, and General Headquarters, in addition to one or more visits each day to the Dressing-stations and Divisional Collecting Station, kept us constantly on the move. Sanitary inspections of billets in the villages—which had at times been occupied by both French and German troops—were all very necessary.

We were much helped by the health of the Division, which was very good, and there was no epidemic of sickness, which we might have expected from our long occupation of the same area. We had three cases of enteric, which caused us some mental anxiety. Fortunately this did not spread. Diarrhoea and vomiting were rather prevalent at one time, and we ascribed this entirely to a want of cleanliness in the cooking arrangements. This also died down after more care in this respect was exercised, and at no time could it be said that sickness in any way hampered the troops. On one day only did the sick exceed in number the wounded; that was October 1, when the sick were fifty-eight and the wounded forty-seven. A very different tale to our previous wars. And yet we had been on the same ground since September 14—ground that was intensely cultivated and highly manured, full of organisms, as exemplified by the tetanus and spreading œdema that some of the wounded suffered from. The men had had a very hard time of it, too, a long exhausting retirement followed by severe fighting and exposure in the trenches, and yet their health did not suffer.

On the 14th, orders were received relative to our move to a new

area. On the night, 15th-16th, the Division was to be replaced in the trenches by French troops. All the transport was to cross the river on the night of the 14th and proceed to concentration and entraining areas independently. The fighting units were to do the same during the next night as relieved. The medical problem was this, How to despatch the medical units so as to be in their entraining areas in proper time and without getting in the way of the other troops. This must be done after dark to escape observation, and yet we could not withdraw all our medical aid, having in view the possibility of the enemy getting to know of the move and making things unpleasant. What was done was this. No. 2 Field Ambulance to remain where it was, at Villers, till the 17th, to collect all the casualties up to the end of the move and clear them to Braisne on the morning of the 17th and then pack up and march to Fismes to entrain there. They sent a small detachment in the afternoon, with two ambulance wagons to Vendresse, and two wagons to Verneuil, to relieve the bearer division of No. 3, and stay there till the last of the troops had left the area, follow on and rejoin their headquarters. Orders were sent to Nos. 1 and 3 to march that night to Branges to arrive at their destination before daybreak, and remain there till they received their entraining orders. This appeared a satisfactory arrangement and in the end worked out all right. On the morning of the 15th we received a message from the 1st Brigade, saying that about forty men of the Black Watch, who had been inoculated against enteric two nights previously, would be unable to march with their unit. This necessitated a visit to Vendresse to see how things really were, and we came to the conclusion that if their kits were carried they would be able to march as far as Villers, where they could stay the night, and rejoin their unit at Blanzky the following morning. An extra ambulance wagon was sent to Vendresse for this purpose, and the matter ended satisfactorily. Entraining orders were then given us for Nos. 1 and 3 Field Ambulances. These we took ourselves to Branges and eventually found both these units. They had had a very bad time of it on the way. There had been considerable rain during the night, making the roads very slippery, and this combined with the dark—as no lamps were allowed—made the traversing of the very hilly country south of the Aisne most difficult. It ended in their not reaching their destination till 9 and 11.30 a.m., instead of before daylight. As there was nothing further to do with the Division till the next morning we proceeded to find the billets of Divisional Headquarters, which were to be at Paars.

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On the following morning, the 16th, at daybreak, we found our headquarters had arrived during the night at Courcelles, the Division having accomplished its move without any misadventure. Later on a final visit was paid to Villers, where we found things going satisfactorily. They had sent the inoculated men to rejoin their unit and had got rid of all their other casualties, except thirty, to Braisne, who were to be fetched in motor ambulances that afternoon. On our way back to Courcelles we met these going there, so we concluded that the evacuation would be satisfactorily completed. The next day, the 17th, was a day of rest for us—the first day since we left Aldershot two months before—as Divisional Headquarters was not to entrain till the following evening. On the morning of the next day, the 18th, my deputy started off with a portion of the headquarters who were going by road in motor cars, and the remainder of us entrained that same evening at Fismes, and so ended our long and stormy stay in the Aisne Valley.

LANGEMARK AND YPRES.

Topography of Ypres District.—There is very little to say about the topography of this part. A very flat country, much cultivated and cut up with canals and dykes, long, straight, embanked roads, half pavé and the remainder soft earth, numerous woods of willow, lime and birch, and scattered farms and windmills; the villages and small towns picturesque, and mostly arranged on each side of a long street; a number of châteaux or small country houses, especially on the outskirts of the larger towns.

The 1st Division arrived at its billets round Hazebrouk and Cassel on the morning of October 19, and stayed the night in these places. Orders were received at 12.15 a.m., the 20th, to march at 6.30 a.m., the same day to Poperinghe, starting point Steenvorde, at 9 a.m. The bearer divisions accompanied their respective brigades, the tent divisions marched together in rear of the column. We arrived at Poperinghe about 11.30 a.m., and received orders to billet there at 2 p.m. The field ambulances billeted complete in their brigade areas, with the brigade sections of the train. All sick had been sent to a clearing hospital at Hazebrouk before leaving that place and Cassel. Orders were received at 12.45 a.m., the 21st, to march at 4.55 a.m., for Langemark and Poelcapelle, the 3rd Brigade as advance guard, followed by the 1st Brigade, the 2nd Brigade in corps reserve, each accompanied by its bearer division. About 8.30 a.m. the advance guard came into action east of Lange-

mark, and the bearer division of No. 3 opened a dressing-station in that village, but on account of the heavy shell fire, directed on the village, shortly afterwards had to retire to a farm on the Langemark-Pilkem road, about midway between those two places, three quarters of a mile from the trenches. Orders were sent to the tent division of No. 2 to open a divisional collecting station at Elverdinghe, distant 5 miles, in a château and some surrounding buildings. No. 1 bearer division stayed at the cross roads at Pilkem. No. 2 in reserve with its brigade in Boesinghe. The tent divisions of Nos. 1 and 3 were parked just east of Elverdinghe, and their ambulance wagons were moved up later on in the day to Boesinghe, distant about $2\frac{1}{2}$ miles, to be handy if required. Motor ambulances now made their appearance practically for the first time, and were under the orders of D.D.M.S. 1st Corps, but they were not allowed to proceed further forward than Elverdinghe, so were utilized in conveying casualties from the divisional collecting station to a clearing hospital which was now opened in Poperinghe.

Divisional Headquarters were at a small collection of cottages on the north of the Pilkem-Langemark Road, about two hundred yards from the cross roads.

No. 3 bearer division evacuated during the day, walking, and at night in wagons and walking, about two hundred casualties. The next morning, the 22nd, early visits were paid to the dressing-stations at No. 3, which had practically been cleared during the night, and to No. 1, which had not as yet opened up. The Divisional Headquarters moved to a farm a quarter mile south of the cross road on the Pilkem-Ypres Road. A quiet morning and but little fighting. On account of the long night's work the ambulance wagons of No. 2 were ordered up in the afternoon to relieve the horses of Nos. 1 and 3, and the clearing of the dressing-stations of No. 3 was proceeded with, as casualties continued to arrive there. The 1st Brigade had now taken up a position on the left of the 3rd Brigade facing north, so the line of the Division now extended roughly from Bixschoote on the left, to just south of Langemark on the right, a distance of $2\frac{1}{2}$ to 3 miles. First-aid posts were established in Langemark village, and in Stenstraat and Hetsaas, and farms along the front.

In the afternoon the 1st Brigade became engaged and there was considerable shelling of the Boesinghe-Langemark road, which caused us anxiety about our ambulance wagons, which were still journeying to the dressing station of No. 3, and for the latter place itself. Cases now began to come in from the area of the 1st Brigade,

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so the bearer division of No. 1 opened a dressing station in a school at the cross roads at Pilkem, and sent out all officers and bearers to cover the country north of the Boesinghe-Langemark road not catered for by No. 3. At our evening visit at 6 p.m., No. 3 had only three cases, having cleared all the others during the day. They later on had a sudden influx of one officer and twenty-seven men, which they cleared with their own wagons during the night. No. 1 had about thirty cases, but a constant stream continued all night, amounting to one hundred and sixteen cases.

The next morning at 6 a.m., the 23rd, the dressing station of No. 3 was empty and at No. 1, one hundred and thirty-five cases had been sent down and thirty remained. The ambulance wagons continued to ply backwards and forwards during the day and night in convoys of five, and kept the numbers well within limits in the dressing stations. The divisional collecting station was now filling up fast, and a message was sent to D.D.M.S. 1st Corps, asking that motor ambulance wagons should be sent there. This was done and casualties were removed to a clearing hospital at Poperinghe.

The dressing station of No. 3 was now practically doing nothing, so its personnel were utilized to help No. 1 by allotting them an area to clear from the east of Langemark to the cross road halfway between there and Pilkem. The bearers of No. 2 were also given an area just east of the canal, including Hetsaas and Stenstraat and roads from there to Pilkem. All cases were brought to No. 1 at Pilkem.

During the night, the 24th, No. 3 had collected casualties from the trenches in front of Langemark, and with its own, had accumulated twenty-one. No. 1 had four hundred during the day and night and had cleared all except forty. There was still a constant flow, but not so many coming in. We got news, about 10.30 a.m., of the probable move of the Division to Ypres, so the following orders were given: No. 3 Bearer Division to clear any cases it had at once and close down, ready to march with its brigade; No. 2 to pack up ready to move; No. 1 to remain where it was and take over all casualties, but to clear as much as possible; No. 2 Tent Division to remain at its present position and take over all casualties, and when clear, to rejoin the division at Ypres. To facilitate this, the D.D.M.S. 1st Corps was asked to send motor transport to clear the dressing stations, but before its arrival we had been able to clear with our horse wagons, and the motors were sent on to the divisional collecting station to clear that. By 6 p.m., the dressing stations were all clear and ready to move. The move of the

division was postponed till dusk, but when it began there was a sharp attack by the French on our left, which had the effect of starting the Germans firing all along the line, with the result that other casualties began to occur, necessitating partial re-opening of No. 1 Bearer Division. Attack and counter-attack went on intermittently all night, resulting eventually in about sixty cases being brought in. Orders were given for No. 1 to remain at Pilkem till the Division had gone, and all cases evacuated, and to inquire of all medical officers of units as they passed whether this was the case.

The Headquarters of the Division left Pilkem the 25th at 6 a.m. and moved into new billets in Ypres, the Division being in Corps reserve. Later on, about 11, we returned to Pilkem to see how the dressing station was getting along, and found a few cases still coming in, but they hoped to be able to leave at 12.30 p.m. Then on to the divisional collecting station at Elverdinghe, which we found nearly empty and being rapidly evacuated by motors. Just as No. 1 Bearer Division were closing down again they received a message from the French to say that there were a few of our wounded left in the convent at Langemark. An officer with bearers and horse wagons was sent to fetch these, and had a very perilous journey from both rifle and shell fire. It ended in their having to leave the wagons some little way outside the village under some sort of cover, and taking the stretchers along the ditches and behind broken walls; they managed to reach the ruined convent and to collect the wounded—seven in number. Just as this was accomplished, a Lance-Corporal of a regiment rode in to say there were a party of seriously wounded just outside Langemark. A high explosive shell had fallen into the last platoon leaving the trenches, and had killed and wounded about thirty men. The Corporal himself had been rendered unconscious, and on recovering had found a horse wandering about, and got on it and rode in. This necessitated another party from No. 1 being sent, and, in spite of the incessant shell and rifle fire, managed to bring in eleven wounded. The remainder were all dead, but the fire was so severe that the party could not remain to bury them. The O.C. No. 2 Field Ambulance, Lieutenant-Colonel Mitchell, having cleared all his wounded from the divisional collecting station, took three motor ambulances and searched all the outlying places for wounded, found a few, and then helped to clear No. 1, and by this means the latter were able to close down and rejoin their Brigade. In the meantime we had gone to Poperinghe and visited a hospital train

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and advance depot of medical stores, and laid hands on a considerable supply of dressings, etc., for the field ambulances. No. 2 Tent Division was now ordered to close down and proceed to Ypres, which it reached the following morning.

The next morning (the 26th) the Division moved from its billets eastwards along the Ypres-Menin road in Corps reserve, 1st Brigade leading. This Brigade got into action fairly early in the day, and No. 1 Bearer Division opened a dressing station in a chateau in a wood on the right-hand side of the road, a few hundred yards west of Geluvelt. No. 2 Tent Division arrived and went into billets near Ypres, on the main road to Menin, and No. 3 opened a divisional collecting station in l'Ecole de Bienfaisance (Industrial School), half a mile east of Ypres on the south side of the Ypres-Menin road, and No. 1 Tent Division in billets at Zillebeke. The Division now extended from south of Zonnebeke to just south of Geluvelt, about two miles, and 2nd Brigade being in reserve on the right. There was a Clearing Hospital in the town of Ypres itself, and ambulance trains were running to Ypres station. The clearing convoy of motors under the orders of the D.D.M.S. 1st Corps, was plying between the Field Ambulances and the Clearing Hospital and ambulance train.

There was not much fighting during the day, except in front of the 1st Brigade. The bearer division of No. 2 was placed at the disposal of No. 1, but the C.O. found he did not require them, so they were sent back to their tent division. Owing to the nature of the road we were on, and the fact that three divisions were practically using it, there was a great difficulty in finding positions for dressing stations, but our policy of having only one was meeting local conditions well. We were able to utilize all the horse ambulance wagons to clear this place to the collecting station, and they worked both day and night. The choice of our divisional collecting station was a very happy one. A fine building, capable if necessary of accommodating up to 2,000, with electric light, hot water, baths and kitchens, and the directors were able to furnish us with a quantity of mattresses and blankets. This building eventually developed into a collecting station for all the divisions along this front. We now utilized the bearer division of No. 2 to relieve that of No. 1 each night, going there at dusk and leaving at daybreak, a very necessary means of rest. This dressing station was very far advanced, in fact some of the reserve trenches were in the garden, but our difficulty was to find another place. There was always a possibility of our line having to fall back, in which case this house

would be in a very perilous position. Still we held on, and though the place was gradually falling to pieces from the concussion of adjacent big guns, and occasional German shells hitting it, it was not till the 30th that we seriously considered evacuating it. On that morning the shells fell incessantly in the wood round the château, scoring a hit on the building itself, so orders were given to evacuate it as soon as possible and try and find a more suitable building farther back. However, by retiring to the cellar we were able to hold on with three officers and two Bearer Sub-divisions, and a new place was considered in the village of Hooze. That afternoon two battalions of the 2nd Brigade were detached to operate on the extreme right, south-east of Zillebeke, and later on two Bearer Sub-divisions of No. 3 were sent to collect their wounded. The military situation was now considered very serious, and remained so for some time, and it behoved us to make every effort to keep our dressing station well cleared, so in the evening extra wagons were sent up for this purpose. Evacuation from the collecting station had not been good during the day, as we had been disappointed of two ambulance trains. Later on these made their appearance, and we were able to do all that was necessary.

The next day, the 31st, things remained much the same; considerable casualties were happening, and the dressing and collecting stations were hard at work. The military situation still remained critical, and demanded rapid evacuation of casualties. About 1 p.m. the enemy succeeded in dropping four large shells into the château at Hooze where the Headquarters of the 1st and 2nd Divisions were, which killed six Staff Officers and wounded seriously the General Officer Commanding 1st Division. During the day No. 3 Clearing Hospital, which was in Ypres, was removed in view of the military situation, and No. 1 Field Ambulance Tent Division ordered to open in the town in the buildings evacuated by it as an additional collecting station. It was considered that No. 3 was somewhat too far forward, necessitating the motor ambulance passing along a dangerous road. We decided that at present No. 1 should serve the area to the south-east of Ypres, covered by the bearers of No. 3. It opened about 9 p.m., and began to receive cases at once. For the next three days matters remained in much the same position. The bearer division of No. 1 withdrew to Hooze and worked over the main road to Menin, those of No. 2 over the area south of this road; No. 3, in reserve, relieving the others alternately. On November 4, owing to the town of Ypres itself being severely shelled, orders were given to try and evacuate

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Nos. 1 and 3 Tent Divisions as soon as possible. In the afternoon No. 1 Tent Division was ordered to Vlamertinghe, and No. 2 to near the same place and to billet there. No. 3, which had so far escaped the shells, remained in the Industrial School.

Before concluding, I should like to explain our reasons for employing the field ambulances as we did, instead of the way foreshadowed in our Training Manual.

The three field ambulances in a division are divisional units. On the line of march they are supposed to march in rear of the brigade ammunition columns; it being granted that it might be necessary in special military circumstances to detach portions of them to be placed nearer the head of the main body. When you consider the length of a division on the march, extending as it does a distance of about fifteen miles, the field ambulances, if marching in rear of the brigade ammunition column, might be at least ten miles behind the head of the column, and to get one of these units up to the front past this long line in front of them would take a considerable time and cause great inconvenience to the remainder of the troops. It also meant that in case of an encounter battle, which seemed to be the most usual form of fighting, orders had a long way to be sent, and again, whatever units or portions of units were required, would have to travel along roads already congested with traffic, and great delay would be the result. A good deal of this was foreseen in the 1st Division before the War, the outcome of various staff tours, and on arrival in France we decided at once to attach each field ambulance to a brigade group, though in no way relinquishing the power of handling them as divisional units. After a short trial of this method a further opinion was arrived at, and that was, that it was unnecessary for the tent divisions to be so far up, so they were then relegated to march with the baggage section of the divisional train, in front of it, and behind the divisional ammunition column, but to billet with the former; the bearer divisions, with a certain number of ambulance wagons, remaining with each brigade, with orders to conform to the movements of their brigade. What did we gain by this arrangement? First, we had all the medical units at all times in known places. That is, that at any time, whether marching or fighting, we were able to find any portion of them. The bearer divisions were always in the place of greatest usefulness, and the tent divisions near enough to be got up when required. This remained the routine order whilst we were with the division, and saved much worry about the position of field ambulances as

well as constant order writing and delay. Carrying further this idea of conserving the medical units we decided to follow as far as possible the notion of concentrating the casualties, both in the forward and rearward positions. That is, by having one dressing station as near the fighting line as possible, which should deal with all the casualties there, and one collecting station, which we called the divisional collecting station, in the rear, to which all from the dressing stations should be sent for further treatment and clearing to railhead. By this means we were able to have up our sleeves a reserve of medical aid that could be utilized on emergency, and to help and relieve that already at work. This on the Aisne we eventually carried out, but at first became committed to positions which took some little while to straighten out. In subsequent battles we fully carried out our ideas, and were much pleased with the result. This, of course, was very much assisted by the narrow frontage generally allotted to the Division. On wider fronts it would be necessary to have more dressing stations, but I do not think more than one collecting station for the Division will ever be needed, and for the further removal of casualties, the advantages of one central position for the clearing vehicles to call at outweigh almost any disadvantage.

Now as regards the selection of dressing stations. It is contemplated that the A.D.M.S. should do this, but we preferred to leave it entirely in the hands of the officer commanding the bearer division, who reported what he had done in that respect to us. He was in a much better position to judge of his requirements and the local conditions. The position of the divisional collecting station we always selected ourselves. As regards selecting positions for dressing stations, it appears that with modern shell fire it is impossible to find places sufficiently advanced to be really useful that are protected from it. Indeed so far we were unable to even find places for the divisional collecting station that were out of range of the heavy guns, and the Chateau at Villers, the last day we were there, and the Industrial School at Ypres both had high explosive shells through them, fortunately without much damage. So I may say that if it is supposed that dressing and collecting stations are to be selected so far back as to be safe from shell fire they would be so far away as to be useless for their purpose.

The partition of the field ambulances into their bearer and tent divisions necessitated re-arrangement of the personnel and vehicles to a certain extent, and this is what we did. The bearer division was increased in personnel by the addition of three officers, and

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the vehicles were four ambulance wagons, one G.S. wagon for baggage and stores, one forage cart for stores, and one water cart. Then the question of the supply wagon arose. There is only one of these in each field ambulance, consequently there would be considerable difficulty in taking food to one or other portion of it. This was overcome by unloading two out of the three forage carts and putting their loads on the G.S. wagon detailed for supplies, and using the forage carts as supply vehicles, one for the tent and one for the bearer division.

Other questions arose, that of feeding the wounded in the collecting station being a most pressing one. As you know, the rations of the wounded men are supposed to be drawn from their units, which proved impossible in practice, or they are to be fed on their iron ration carried in their haversacks, but these had always been given or taken away. So what we did was to draw direct from the supply column at refilling point a percentage of rations from each brigade group for the collecting station. This inflicted no hardship on anyone and answered the purpose well.

Another point is the disposal of the arms and ammunition of the wounded. At first all the arms and equipment were handed over to the ordnance officer, and the ammunition to any passing unit, or to the ammunition column, but this had to be modified. The slightly wounded took their arms and equipment with them to the clearing hospital, and only that of the seriously wounded was handed over to the ordnance. This was found necessary, otherwise the lightly wounded who returned in a few days to their units were, if their arms, etc., had been handed over to the ordnance, without the necessary means of fighting, and the units kept no surplus stock. It soon became known, too, that ammunition and arms could be found at the collecting station, and units used to apply there for them.

The question of stretchers, blankets and clothing for wounded was also an important one. We found at first that our stretchers and blankets went down to rail-head and none came back, but by making arrangements with the Officer Commanding supply column and Officer Commanding clearing hospital and ambulance trains, we were able to keep a constant supply circulating up and down. Many of the seriously wounded arrive with their clothing very torn and dirty, and sometimes with scarcely any clothing at all. The supply of twenty suits of hospital clothing to a field ambulance does not go far, but again we were able to meet this by gifts from the Red Cross Society. These are points that appear trivial, but

when confronted with them in the field they demand some thought. With the new motor ambulance convoys the blanket and stretcher question is met by each blanket and stretcher sent down being replaced by one from those carried by each car. Remember, too, that stretchers get broken and wear out.

The replenishment of medical and surgical material is now much simplified by the same motor convoys, as they are able to bring up as much as is required whenever wanted. The replenishment of horses was undertaken by the Assistant Director of Veterinary Services with the Division direct with the Officer Commanding field ambulance. We found that, with the constant work day and night, and in spite of ample food, the horses wore out very quickly, but it should be insisted that the greatest care should be taken of them, as the Officer Commanding field ambulance is personally responsible for them.

Inter-communication between the A.D.M.S. and the Officers Commanding field ambulances was another point that we had expected to give us trouble, but contrary to all expectations we had no difficulty in the matter at all. Messages from Divisional Headquarters to the various bearer divisions went via Brigade Headquarters, or else direct, as they were always easily found, and the same with the tent divisions, the whole secret being to be able to say exactly where each was. The A.D.M.S.'s messages were lettered "M," and were handed into the Signal Office, signed in the usual way.

The field ambulances communicating with the A.D.M.S. sent messages either by their cycle orderly, or through Brigade Headquarters.

There are one or two more points about the selection of dressing stations and collection of wounded I should like to bring to your notice.

As you know, the bearer divisions acting with the brigade groups had orders to select their dressing station without any reference to headquarters except reporting what they had done, and the point to remember is to select a building large enough for your purposes, that is, large enough to accommodate a good number of wounded. One large building, or a group of buildings, like a farm, is better than a series of small houses from every point of view, better controlled, more comfortable, more noticeable, and that is a great point, and more easily cleared. Also one with a cellar for safety from shells. As I said before, safety from fire is difficult to obtain, but the ordinary house wall

will keep out the rifle bullet, and most of a shrapnel, and it is only the high explosive you need worry about. In managing a dressing station there is one thing of immense importance, and that is the immediate comfort of the wounded. I mean their mental and bodily comfort more than the comfort to their wounds. A comfortable place to lie, a basin of hot soup or tea, and a cigarette really do more for a man than surgical interference in most cases. I do not mean to imply that the surgeon is of minor importance, but that in the professional care of the wounded patient, you must never lose sight of the fact that he is a tired, cold, hungry and uncomfortable man. The divisional collecting station practically becomes a hospital where a great deal of surgical work can be, and is, done, and where the wounded can be well looked after, but it may be some hours before the wounded can be got there.

The collection of the wounded in the front is a difficult subject, and it is impossible to lay down any hard and fast rules. We found that the lightly wounded found their own way in, almost as soon as they were hit, the more seriously were brought in by the regimental stretcher bearers as soon as possible, and that the main idea was to get the wounded man away quickly from the scene of his injury. On the Aisne, where regimental aid posts were possible, and at Langemark, where they existed in a more modified form, the Regimental Medical Officer could control the wounded; but outside Ypres, where the flat, exposed ground made any movement outside the trenches very risky, the medical officer had to take up his position in one of them and trust to luck in being able to see the majority of the wounded.

The constant night and day fighting added to the difficulties; on a clear night the slightest signs of concerted movement led to an outbreak of firing. On dark nights, the absence of lamps, for the same reason, hampered the work, and even the use of electric torches would draw fire; but in spite of all these difficulties individual initiative succeeded, and aid was rendered. That piece of debatable land between the opposing trenches was always a bugbear, and it was often impossible to do much to help those fallen there, though single men used to go out and render aid and often manage to drag the wounded man in. But the real work of the regimental medical officer must be left to him to devise in actual fighting conditions, and once the difficulties are realized and thought over, that important factor, initiative, will do the rest.

CEREBROSPINAL MENINGITIS IN THE SALISBURY
PLAIN AREA DURING THE EARLY PART OF 1915:
A LABORATORY STUDY.

BY LIEUTENANT C. H. TREADGOLD.
Royal Army Medical Corps.

PART I.

GENERAL OBSERVATIONS.

(1) *Statistical.*—Between February 9 and April 11 the throats of 594 soldiers were examined. The meningococcus was found in 128 (21·2 per cent). At the time of writing (April 16) 85 are still carriers. In 30 of these the germ has persisted for more than a month, while in 3 cases two months have elapsed since the first examination. These 594 men represent the contacts of 31 cases of cerebrospinal fever, of which 19 occurred between February 9 and March 11, and 12 between March 11 and April 13. That a definite decrease has taken place may be regarded as satisfactory, when the constant influx of fresh troops into this area is taken into account. One of the earlier cases still harbours the meningococcus, although he has been convalescent for some weeks.

(2) *How does Infection of Contacts Occur?*—That the germ is aeri-ally transmitted from throat to throat, and that close contact facilitates such transference, is generally admitted, and abundant evidence in support of this view was obtained. Men, crowded together in huts in which one of their number developed meningitis, usually showed a high proportion of positives, while in contacts who had not slept in the same room with the case, and in hospital orderlies, the percentage of carriers was markedly reduced. Thus, in a batch of 39 contacts 32 had slept in the same hut with A—the man who developed meningitis—and of these no fewer than 21 were positive. The remaining 7 met him in the office, and 2 of them were positive, but on inquiry it was found that these 2 alone sat at the same table with A, thus coming into closer contact with him than the other 5, who were negative. One more instance may be given: 12 contacts were swabbed, only 3 of whom had slept in the same room with the case; 2 of these were positive, only 1 carrier being found in the remaining 9.

I may here state that I came across no evidence in favour of

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this disease being transmitted by blood-sucking insects such as lice.

(3) *The Relation between Pharyngitis and Positive Contacts.*— It has been stated that the presence of the meningococcus in the nasopharynx is invariably associated with pharyngitis. It has even been suggested that routine bacteriological examination is unnecessary, and that the swabbing of those contacts who complain of sore throat would meet all requirements. Such an attitude cannot be too strongly condemned. Although pharyngitis is undoubtedly present in a fair proportion of carriers, its course is so benign as to produce no objective symptoms in the vast majority of cases. Contacts who complain of sore throat only show a slightly higher percentage of positives when contrasted with those in whom this symptom is absent. At Tidworth the question was put to every contact before being swabbed, and out of 48 men who complained of sore throat only 13, or less than 28 per cent. were positive. Clearly this symptom is of no practical importance.

(4) *The Treatment of Contacts by means of Vaccines.*— The production of an active immunity in contacts is obviously a prophylactic measure of great importance. So far as I am aware, the only statistics at present available are those of Sophian.¹ Eleven students were injected in varying doses, the resulting immunity being controlled by agglutination and complement fixation tests. Later, about 280 families were inoculated in Kansas City. Three injections were given at intervals of a week in doses of 100 million, 500 million, and 1,000 million. In none did the disease subsequently occur. So far as the 11 students were concerned, the reaction consisted principally of some local inflammation at the site of injection, and usually some trivial general symptoms. All symptoms had much improved, or entirely subsided, in twenty-four hours. However, this author states that "as a result of the injections the patient may suffer from intense headache, may have some general bodily pain, nausea and vomiting, with rise of temperature to 102°, 103° or 104° F., although these severe symptoms are somewhat unusual." In favour of giving smaller doses of vaccine than those employed by Sophian it may be urged that the meningococcus, being a germ of low virulence, only a very small proportion of those exposed to infection ever develop meningitis; moreover, cerebrospinal fever is probably the only form of meningitis in which

¹ Sophian: "Epidemic Cerebrospinal Meningitis," London, Henry Kimpton, 1913.

recovery takes place at all. One is therefore entitled to expect that small doses of vaccine—doses which fall short of producing noticeable general reactions—will prove sufficient to prevent the development of the disease, even in relatively susceptible persons.

Personal Experiences.—A polyvalent vaccine made from seven local strains was used. The organisms were emulsified in normal saline, killed by heating for one hour at 56° C., and counted in the usual way; dilutions were made with normal saline, to which lysol, in the proportion of $\frac{1}{4}$ per cent, had been added. Complement fixation work being impracticable, I intended controlling the immunity produced by agglutination tests. Unfortunately it was impossible to obtain agglutinable strains. Strains obtained from cases of cerebrospinal fever, from carriers, and also a polyvalent formalized emulsion, kindly supplied by Drs. Ledingham and Arkwright from the Lister Institute, all failed to agglutinate with sera obtained from both acute and chronic cases, even in so low a dilution as 1 in 10 after twenty-four hours. It was then determined to find out the minimum dose capable of producing a reaction. For this purpose 10 positive contacts were taken and put on a four-hourly temperature chart. The initial injection of 10 million cocci produced no reaction whatever, either local or general. On the third day 25 million cocci were injected, and in 7 cases a transient erythema at the site of the injection was the only sign. In the remaining 3 slight swelling and stiffness of the arm were noticed in addition, while the temperature varied between normal and 100° F. during the next twenty-four hours. This slight rise was followed by a corresponding fall, the temperature remaining subnormal for a day or two. However, the normal was regained by the fourth day, when a further injection of 50 million was given. The next 32 positive contacts were given an initial dose of 25 million, followed by a further dose of 50 million on the fourth or fifth day. A definite, though variable, local reaction occurred in every case. The morning and evening temperatures were taken during the ensuing twenty-four hours, but no rise was detected. It was therefore determined to inoculate all future contacts with 50 million cocci, followed after a week by a further dose of 100 million in those cases which turned out to be positive. Nearly two hundred men have now been inoculated. Not one has complained of feeling even temporarily unwell as a result of the injections, and in no case has a temperature of over 100° F. been recorded. Up to the present time there has been 1 case of cerebrospinal fever amongst 49 unvaccinated carriers, whilst no

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case has occurred amongst the 79 who were inoculated. Of course these figures are far too small to enable one to draw any conclusions, but whether the above-mentioned doses are sufficient to ensure protection or not, it is evident that their employment cannot give rise to severe general reactions; moreover, all danger of producing a negative phase is abolished.

CHART I.

	Nos.	No local treatment			Nasal douching		
		March 17 & 18	March 24	March 26	March 29	April 9	April 15
Vaccine treatment	1	+		-	+	-	+
	2	+		-	+	+	+
	3	+		+	+	-	+
	4	+		-	+	-	-
	5	+	-	-			
	6	+	-	-			
	7	+		-	+	-	+
	8	+		-	+	+	-
	9	+		+	+	+	-
	10	+		-	+	-	-
	11	+		-	-		
	12	+		-	-		
	13	+		+	-	+	+
No vaccine	14	+		+	+	+	+
	15	+		+	-	-	
	16	+		-	-		
	17	+		-	+	+	-
	18	+		+	+	-	+
	19	+		+	+	+	-
	20	+		-	-		
	21	+		-	+	+	+
	22	+		-	-		
	23	+		+	-	-	

(5) *Do Vaccines help in Ridding the Throat of the Meningococcus?*—To elucidate this question, the positive contacts of two successive days' swabbing were taken. Their number amounted to 23; 13 were inoculated, while 10 were left alone—local treatment being avoided in all cases for the first fortnight. After this all throats were sprayed twice daily with 1 in 1,500 potassium permanganate solution. The appended table, Chart I, indicates the results obtained. It also indicates the advisability of a second negative report before letting a suspected carrier go. It will be seen that after four weeks 12 men were still carriers or suspects, and that 7 of these had been inoculated. The first 4 on the list received a third injection of 250 million on April 9, but 3 out of the 4 were still positive on April 15. These results show that vaccine treatment is of no great utility—at any rate in small doses.

(6) *The Treatment of Cerebrospinal Fever by means of Auto-genous Vaccine.*—This was tried in 4 cases. In 2 of them, 3 injections of 5, 10 and 25 million cocci were given every other day. In the third case an initial dose of 50 million was given, followed by 100 million on the fourth day. There was an entire absence of response in all 3. In the fourth case 50 and 100 million were given as before, but were followed up by a further dose of 250 million the next day. This last injection produced a slight local reaction, but had no obvious effect either on the temperature chart or the condition of the patient. I have no information as to the results obtained by other observers; however, these doses would seem to be insufficient.

PART II.

BACTERIOLOGY.

(1) *Technique.*—The technique employed for isolating the meningococcus from throat swabs is sufficiently well known; however, one or two points may be emphasized. One plate is sufficient, provided the end of the swab be brought into contact with the water of condensation and the resulting emulsion lightly rubbed over the surface of the medium by means of a small glass spreader. When examining a number of contacts several of these spreaders, about three inches long, are stood upright in a fragment of plasticine, each being flamed immediately after use. If the water of condensation be insufficient, a large loopful of sterile water placed on the under surface of the lid gives equally good results. Discrete colonies are almost invariably obtained by this method, and much

time and trouble are saved. The plates may be examined the next morning—personally, I prefer to leave them in the incubator for thirty-six hours. Touching the sugars, several potential sources of error exist. (a) A strongly acid reaction is almost certainly due to contamination, as the quantity of acid produced by the meningococcus in the litmus - lemco - glucose - serum medium is small. (b) When no glucose fermentation has taken place, one must be certain that growth has occurred before ruling out the meningococcus.

(2) *Doubtful Meningococci*.—I have several times met with meningococcus-like colonies, composed of Gram-negative cocci, which gave a good emulsion and the correct sugar reactions, and yet showed growth on serum agar in forty-eight hours at 23° C. I have also encountered colonies which differed from the previous ones in that neither glucose nor cane sugar was fermented, while serum agar slants showed no growth after incubation for forty-eight hours at 23° C.

Possibly the incubator was at fault in the first case, although it had been previously tested with a maximum and minimum thermometer; in the second case the organism was probably not the meningococcus. Failure to grow on the optimum medium in forty-eight hours at room temperature, together with the correct sugar reactions, are perhaps the most satisfactory corroborative tests.

(3) *Vitality of the Meningococcus*.—All observers agree that subculture every two or three days is necessary if the organism is being cultivated on solid media. In fluid media the meningococcus lives much longer; according to Gordon,¹ a successful subculture from ascitic broth incubated at 37° C. may be obtained after a fortnight. However, I can find no details as to the vitality of the meningococcus in the absence of such media, and, like Gordon, I have been unable to find particulars of any experiments made to determine the vitality of the meningococcus when dried in the body secretions. The following investigations were accordingly made:—

(a) Isolated colonies from original serum agar plates, or the first subcultures from these, were touched with dry sterile West's swabs, the swab being immediately withdrawn into its sheath. Fresh plates were inoculated after varying intervals of time and

¹ Gordon: "Report to the Local Government Board on the Micrococcus of Epidemic Cerebrospinal Meningitis and its Identification, 1907."

incubated at 37° C. These experiments were repeated on several strains, but no growth ever resulted after exposure to daylight and room temperature for more than one hour. When the swabs had been previously moistened by dipping them into sterile water, meningococcus colonies developed after exposure to daylight and room temperature for two hours, but not longer than this. If daylight and desiccation were avoided, colonies developed after a considerably longer period; the exact limit has not yet been determined.

(b) The vitality of the meningococcus in swabs from the throat was tested in the following way: 8 carriers were chosen, 3 swabs being used for each, or 24 in all. Control plates were inoculated from the third swab in each case, and meningococcus colonies subsequently developed in 6 of them. The remaining 16 swabs were divided into four lots, the corresponding plates being inoculated three, six, nine and twelve hours after the swabbing, and then incubated at 37° C. In the interval, the swabs were left on the laboratory bench at room temperature; they were nearly dry in six hours and absolutely dry after nine hours. In no case did meningococcus develop, although the plates, with one exception, showed numerous colonies, among which other Gram-negative cocci were well represented. In the next experiment 22 swabs were used for 11 carriers, the first swab in each case being used as a control. The remaining 11 were placed in a dark cupboard, plates being inoculated every hour after the swabbing, starting at two hours. None of the swabs were completely dry, even after twelve hours.

Results.—A summary of results will be found in the accompanying table, Chart II. It is noteworthy that a plate inoculated eleven hours after the throat was swabbed showed a copious growth of meningococci when examined thirty-six hours later. This experiment shows the meningococcus to possess considerable vitality in the absence of light and desiccation. Should it be impossible to inoculate plates immediately after swabbing, growth may be reasonably anticipated up to twelve hours, if the numbered swabs be placed in an air-tight receptacle.

(4) *The Relation of the Meningococcus to Cerebrospinal Meningitis.*—That carriers of the meningococcus so seldom develop cerebrospinal fever is a striking epidemiological fact. The usual explanation given is that the vast majority of people possess sufficient natural immunity to prevent the germ getting into the blood-stream. This is a reasonable supposition, but the possibility

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of other factors coming into play is by no means exhausted. For instance, Hort, Lakin and Benians¹ have recently suggested that the meningococcus may merely be a non-infective phase of the causal organism. They claim to have isolated Jaeger's coccus (*Diplococcus crassus*) from the blood, cerebrospinal fluid and urine of cases, and also describe a very pleomorphic organism obtained from a catheter specimen of urine after passage through a tested Berkefeld filter. The same colony showed Gram-positive and negative cocci and also Gram-positive and negative bacilli; some of the latter were granular and were seen to be breaking down into diplococci indistinguishable from meningococci, while on subculture Jaeger-like organisms predominated.

CHART II.

Name of carrier	Result in control plate	Time of inoculation of second plate	Result
Knott	—	After 2 hours	+
Easy	—	„ 3 „	—
Urquhart	—	„ 4 „	—
Lusty	+	„ 5 „	+
Thornton	—	„ 6 „	—
Bushell	+	„ 7 „	—
Langley	—	„ 8 „	—
Milner	—	„ 9 „	—
Douglas	+	„ 10 „	—
Richardson	+	„ 11 „	+
Swanston	—	„ 12 „	—

Personal Observations.—I frequently isolated rounded Jaeger-like diplococci from the throats of contacts. At first chiefly Gram-negative, they became almost completely Gram-positive after repeated subculture. On serum agar, the small transparent colonies changed on subculture into a fine bluish-grey growth. Both glucose and cane sugar were fermented by the strains examined. In two cases these cocci were cultured from the cerebrospinal

¹ *Brit. Med. Journ.*, March 27, 1915, p. 541.

fluid. One of them was exceptionally interesting in that Jaeger's coccus was first obtained alone, although the meningococcus was found at a later date in pure culture. Soon after reading the article referred to above, I came across a case in which no cocci were noticed in stained preparations from the cerebrospinal fluid, while cultures remained sterile after forty-eight hours' incubation at 37° C. As this seemed to be a suitable case for experiment, a catheter specimen of urine and cerebrospinal fluid, removed with the usual precautions, were passed through a sterile Berkefeld filter, the candle of which was impervious to meningococci. The filtrates were plated out on to serum agar. In both cases small, flat greyish colonies with irregular margins developed within twenty-four hours. Microscopical examination revealed the pleomorphism described by Hort and his co-workers, but these organisms differed in that no Gram-positive cocci were present. They never grew freely on serum agar and refused to grow on agar for some days. After passing through a phase characterized by the predominance of Gram-negative beaded and bipolar bacilli, which subsequently broke down into coccoid granules, the growth ultimately assumed the form of long filaments, in places resembling a simple mycelium, but no branching was ever detected. In the colonies from the cerebrospinal fluid, bodies resembling yeasts were noticed after several subcultures. A further attempt was now made to grow organisms from the unfiltered cerebrospinal fluid. A single colony developed after four days' incubation. It was rounded, rather opaque and viscid, and composed of Gram-negative cocci which emulsified freely; subculture on to serum agar at 23° C. showed a copious growth in twenty-four hours. Neither glucose nor cane sugar was fermented. The patient died, and permission for the autopsy was fortunately obtained.

Autopsy.—Thick greenish pus surrounded the spinal cord in the lumbar and lower dorsal regions. The subarachnoid space in the upper dorsal and in the cervical region was full of turbid fluid, as also were the cisternæ at the base of the brain and the lateral ventricles. The cerebral convolutions were obscured, owing to the presence of greenish pus in the subarachnoid space. Microscopical examination revealed many encapsuled pneumococci, and colonies of these were obtained on serum agar. Rounded Gram-positive diplococci, which differed culturally from Jaeger's coccus, were also present. Gram-negative cocci, beaded Gram-negative bacilli and yeast-like organisms were also obtained. No growth resulted after passing ventricular fluid through a Berkefeld filter.

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In a second case cerebrospinal fluid, rich in meningococci, and a catheter specimen of urine were passed through the filter. The plates remained sterile.

Conclusions.—These two cases were undoubtedly examples of pneumococcal and meningococcal meningitis respectively, the first case being complicated by the presence of the pleomorphic and other organisms already described. In my opinion Jaeger's coccus and the organism described by Hort, Lakin and Benians also merely represent secondary infections. That these secondary infections are of great interest cannot be denied, but the incrimination of such organisms as ætiological factors in cerebrospinal meningitis, especially in the absence of post-mortem examination, would seem to be quite unjustifiable at the present time.

I am indebted to my brother, Lieutenant H. A. Treadgold, for much help; he was entirely responsible for the agglutination work. I have also to thank Major Gordon, R.A.M.C., and Lieutenants Llewelyn and Johnstone, R.A.M.C., both for suggestions and assistance.

SOME MUSINGS OF AN IDLE MAN.

BY COLONEL R. H. FIRTH.

UNDER this title, one has ventured to put down on two previous occasions certain reflections which have occurred in idle hours. In submitting a third article upon the same lines, one has no design to make converts to any new philosophic theories. As a scribbler and contributor to our Journal, one is dominated by the view that the whole object of writing is to stimulate thought. The reader can come with me only so far as he is impelled to come. A motor-car best serves the rich man in a hurry, while a donkey cart meets the needs of the coster-monger, to whom time and luxury are not pressing necessities; each man progressing in his own fashion and in accord with his own means. So, in the matter of thought and knowledge, only that which a man finds best suited for his difficulties and attainable by his own means can be of real service to him in the quest for truth and contentment. If a man be happy and satisfied in the ideas which he has, finding that they resist the honest attack of his own powers of reason, he is justified in keeping them; but we must qualify the statement by remembering that a man's capacity to use his mind is the truest evidence of his comparative advancement in the process of mental evolution. Probably, in the present day struggle for life, many people are either too lazy or are not free to think honestly, being compelled by forces largely beyond their control to align themselves with some one or other great group of organized opinion. However regrettable this fact may be, more or less every man, whatever outward service he must give, is consciously aware of his own esoteric interpretations. Personally, in respect of interpretations, one has ever been free from conventional bondage, and these articles are but records of the road and direction in which one's own thoughts have wandered; such tracings may be of little value, but one is induced to outline them as suggesting possibly a path to be followed, or giving a stimulus to the thoughts of others.

I.

Every doctor, at some time or another, has been present at a death-bed and noted the moment when life actually left the body. At such a time, even the most thoughtless cannot be unmindful altogether of self-searching suggestions. A recent incident of the

kind brings home to one, once again, how profoundly interesting is that mysterious diversion of individual energy into a new channel, which we call death. This definition is surely legitimate, in that the moment of death is nothing but that instant of time when energy leaves the physical and familiar form. Equally legitimate is the definition of life as but the special association for a few years of fractions of energy and substance. The few years of association we call life, and the parting company or dissociation we call death. To each one of us, the time for that dissociation will come, when the ego has to discard the bodily tenement which it now occupies, and the thought is irrepressible, and what then? During all recorded time this question has been present to man. One is not here going to try and discuss it, simply because it is undiscussable, and we not only do not know but cannot know. It is at present unknowable to us, but one is not prepared to admit that it is absolutely unknowable. The only clue towards the answer is an instinct, persistent and universal, that we cannot lose our individuality. Those aggregates of energy, once held together in an earthly body and forming what one may call the essential ego, must always hold together. We cannot conceive their diminishing, we ever think of them as merging ultimately into a wider consciousness.

A thought that has often occurred to one is, in the case of natural death surely the process of death is a gradual one or, to put it in another way, the forces which compose in the aggregate our individual entity leave the physical frame gradually so that few of us know when we are beginning to die. Some of us do know, but few are prepared to admit the fact. Whether natural death be a gradual process or not, the energy which leaves the body as the outcome of dying or death is not lost. If it be lost, why should we bother about reproducing our species? Some may reply, we are impelled to reproduce by an instinct clinging to us from a lower state. Not only is that true, but the impulse is recognizable in our day as antagonistic or incompatible to the sense of the most highly evolved, and, as more and more reach that higher stage of evolution, there will be nothing left to induce man to go on peopling this earth except the knowledge of his imperishable ego.

Discussing this matter with a man recently, he remarked why should there be any death at all, surely evolution could secure its end without death? The reason or answer seems to be, that no type of organism can survive which is not so constituted and so

co-ordinated that it can complete a life-cycle culminating in the transmission of a similar structure to its descendants. Those organisms and their descendants which have varied in a direction which gives them a smaller chance of surviving become extinct in the struggle for existence. On the other hand, those which have varied in such a direction as to give them a greater probability of surviving will increase and multiply, displacing the inferior types. By this blind operation of natural selection, through countless ages, higher and higher types are produced. The deduction is that the opportunity for change or evolvement in any single living organism is extremely limited and that death follows unavoidably. An individual dog or cat cannot change its colouring or kind of coat, but a series of generations of dogs or cats can bring about those changes. Take the case of man, if one of his simian archetypes had lived a million years its brain could never have developed or presented the workings of the human mind. It has been by incessant evolution through countless generations and constant reproduction that the ultimate descendants of that simian are men. Death seems the only way by which to preclude crowding the earth with stationary types, and through reproduction the gradual advances are made. If this be true of morphological evolution, why not of psychical evolution? Our ego or personality is held bound to the physical form and limited by its power of expansion, but death permits the discardment of the bodily frame and the escape of the individual ego to continue its development elsewhere. The critical reader may here say, this brings us perilously near the Aryan views of the transmigration of souls. It does bring us near but not into that enclosure. If we think logically, we must all have died many thousands of times, for the units of energy which constitute our present individualities must have passed through many thousands of metamorphoses. Look where we will, all Nature proves herself to have been an infinitely gradual production, working through countless forms and conditions. Why should our personality, our ego, be an exception to that rule? Most of one's Brahmin friends believe implicitly that they have passed through other physical forms. Possibly they have, possibly they have not; so far, we have no evidence either for or against their contention; but, whatever may have been the method of man's evolutionary advancement, we cannot escape from the view that he has reached his present highly evolved condition only by passage through innumerable changes

or grades of development which, from the physical life point of view, we call birth and death.

The difficulties of this conception are exaggerated by our habitual attitude of mind towards the whole question; an attitude due largely to our literal interpretation of the beautiful Christian doctrine of resurrection. That interpretation arises again from the personal self-sufficiency of the human mind. Many people have the idea that what they think and what are beliefs of their own time are the last word, and even are annoyed if it be suggested that their own age may some day be labelled pre-historic. From such an attitude it is but a step to assume, as so many do, that we ourselves are the last word or supreme and final product of evolution. Few of us care to think that this world of ours some day may contain beings endowed with higher capacities than ourselves. But what right have we to deny the suggestion? None, for we have no grounds to suppose that evolution, which has been proceeding for millions of years along a path of ceaseless advance is going to stop suddenly at man. On the contrary, the very consciousness within us all that there are powers we do not possess impels us to accept the view that man's evolution is towards a super-man. If this be so, the thought is irrepressible that in the presence of that super-man our types will be existent as an inferior and perhaps disappearing race. The super-men may not possess our powers any more than we men possess at present certain powers of the lower animals, but have to enlist their aid. Developing the thought still farther, one pictures a world where men will not be permitted to oppress and tyrannize others, to fight or even lay down the law, but they will be allowed to make their mechanical contrivances for the convenience of themselves and of super-man, also will be allowed to bargain or make money, and generally enjoy themselves according to their lights. Some may think this a fanciful picture, but it merits thought and is clearly warranted by evolution.

At this point we may return to the question: and what then? Readers of this Journal know that one has a fancy for wandering in old cemeteries and noting graves or monuments of men of the past. Now, nothing has struck one more forcibly than the persistent manner in which the dead are referred to as sleeping. Surely, death is better and more truly regarded as an awakening from sleep or illusion. To appreciate this conception, we need to remember that man's consciousness as manifested during life is not a series of isolated states of consciousness, neither is man or his brain the seat of an independent and self-existent ego of which

consciousness is the activity, and neither is man conscious merely of his own organic activity. Man in life is conscious clearly of an outside environment distinguishable from his organic existence and tending to further or hinder it, also he is conscious of reacting himself in ways to control this environment more or less successfully. Man is thus conscious both of himself as an organism and of a something which does not belong directly to his organism. Further, the world as perceived by man is a world of elements which are not self-existent, but exist only as related to each other temporally and spatially. This world of perception is apparently centred in ourselves or in man's own individual organism. Man in life perceives the world not merely as matter, but as matter in relation with his own organism and practical life. Man cannot separate his world from his interests in it, and it is this which gives unity and coherence to the world of man's conscious experience. By or in thought, man can regard this external world as if the appearances in it existed entirely apart from their purposeful or utilitarian relations to himself, but this is an abstraction from reality. Any apparent self-existence of things in the form in which they appear to man are themselves the creation of his own thoughts, hence we arrive at the conclusion that to man the world of his living experience is nothing but a world of his own personality, or the world he sees is nothing but a world which by painful human effort he has learnt gradually from infancy to fashion in thought and action. When death comes to man, he passes from this condition, or rather his ego or personality awakes from that dream state in which it has regarded the cosmic external world when in a state of association with the human physical frame, and emerges into a state infinitely fuller than the earth life.

One has just used the word dream, and the analogy that death is really a waking from sleep or state of illusion is supported by thoughts concerning the dream state. Every student of psychology knows that dreams occur at or accompany our waking from physical sleep. Emerging from that physical condition, we pass into or are conscious of a state of existence different from and fuller than our daily earth life which we have but just left and to which we return as the dream passes away. Take a personal case, one dreamt vividly a few nights or early mornings ago that one had or was having a set-to with marauders and that oneself had been shot dead. One did not die but one woke up, hence the dying was lost in the waking and, from this and other points of view, death or dying is really waking. At this point one is reminded of

certain lines by Wordsworth in his Ode on the intimations of Immortality. He looks at it from the religious aspect, a point of view from which one is not discussing the question; but the lines are so apposite to the argument that one is tempted to quote them:—

“Our birth is but a sleep and a forgetting
The soul that rises with us, our life's star
Hath elsewhere had its setting and cometh from afar.
Not in entire forgetfulness, and not in utter nakedness,
But trailing clouds of glory do we come
From God, who is our Home.”

As self-conscious men we are apt to look on death as something very solemn; it is interesting to examine the reasons for this. That we do regard it as the most solemn of events is because to us it marks the limit of our existence as apprehended by our senses. But the consciousness of man or his sensal apprehension of things covers but a minute period in relation to universal time, and yet upon that tiny period is built all the wisdom of man. The most learned of us know nothing of what precedes the cradle or what succeeds the grave. All we know is a life in a physical frame with physical functions, any other condition appears unreal and unknown to us, consequently as death marks the border-line between what we have experienced consciously and what we have not consciously experienced, we regard it as a most solemn thing. Apart from this, death too often means separation from those to whom we are bound by ties of affection, or its occurrence means the incompleteness of a task such as the financial provision for beloved ones. All this tends to make us regard death as something awesome and solemn, but it throws into prominence the narrowness and selfishness of our human nature. As thinkers, we cannot suppress the thought that perhaps we are concentrating our love upon too narrow a field, and what should be distributed over all animate creation is focussed upon a few relatives and friends. One recalls an intimate who endured acute grief at the painless death of his child, yet, a few days later, found pleasure in shooting rabbits and heard unmoved their piteous shrieks of pain and fear when wounded. It suggests a curious mentality and might be amplified by many other examples of incongruity. They really are warped affections or love specializations, and find expression in other anomalies such as the unhesitating prolongation of some naturally exhausted human life by drugs and all the arts of medicine alongside of the unhesitating shooting or poisoning of some animal either aged or incurably ill.

The popular sense of the solemnity of death finds expression in outward and deliberate symbols of grief, called mourning. Some appear to extract a special kind of enjoyment from these dressings of woe, but the practice of thus publishing private griefs in this way is explicable only as mere vanity or that desire in man to attract attention. How often does one see the man with a black band round his arm, clearly wishful to call the attention of his little world that someone connected with himself has died, but all unconscious of the obvious bad form which such a sartorial solecism stamps upon him. Why parade any grief we feel? If a person is dead he is dead, and no amount of sombre raiment or black armlets will bring that person to life again. Our duty is to the living, so why depress and offend their æsthetic sense by such garish means of self-advertisement?

We have passed in review some reasons why death is habitually regarded as a solemn thing, but it is doubtful whether any of them provide real justification for that attitude. Our own instinctive actions suggest that death is not a solemn thing. As one writes this now, a beetle persists in fouling the pen and crawls through the wet ink. One flicks it off wholly unconcerned that such a flick means death to that beetle; so again, one takes a malicious pleasure in crushing on one's hand the mosquito which has worried and annoyed. The truth is, we attach no importance to death until it approaches our own species, and the individual's sense of the significance of death increases in exact proportion as it comes nearer to affect himself and the circle of his lovings and likings. In plain words, death has no significance apart from love, and if we take the effect of love from death there remains to it little solemnity. These musings, therefore, bring us to this situation, that death is really an awakening to a fuller life, and has no actual claim to be regarded as a sleep or rest and still less as a "destroying angel." No positive thing can be destroyed and destruction in the sense of annihilation is inconceivable. When we withdraw energy from matter, neither the energy nor the matter are destroyed, both are applied to other services. The same is true of the unit of existence, call it soul or what we will; it is indestructibly permanent; death and birth mean merely stages or times of its translation and change in the course of its evolution to the highest state. Of death it may be truly said, its symbol is a comma rather than a full stop, while the ceremonial of earthly burial is better ritualized by the sounding of *reveillé* than the last post.

II.

When inspecting a certain hospital last winter, one was shown a European soldier who, three days before, had been rescued in an unconscious state from threatened drowning in the Kabul river. The occasion was too rare and tempting to refrain from asking the man his experiences, more particularly as to whether, in accordance with popular belief, he had experienced any panoramic review of his previous life. Somewhat to one's surprise, the man said that he had such an experience, but it did not cover the totality of his past life. He stated that suddenly the memory came back to him of many things which he had long forgotten, the sensation being that he felt as in a dream. Pressed as to the time when this so-called dream occurred, the man expressed himself in the following words: "I realized suddenly that I was going to die and had no interest in life." One left the man profoundly impressed, especially with the expression "no interest in life," and passing down the ward came upon a case of amnesia with some aphasia following a fall from a horse. In itself, this case presented no special clinical features, but its presentment within a few minutes and yards of the other started a train of thoughts which merit analysis, and on which it was difficult to refrain from enlarging while making the official inspection. Those thoughts were as to the real nature of memory or recollection and its relation to cerebration; one's musings on the two cases formulate themselves on the following lines.

It is of the essence of mental things that they do not lend themselves to measurement. Realizing as we do that consciousness is bound in some way or other to a brain, the temptation has been great to consider the cerebral fact as the equivalent of the mental. All our mental science and all our metaphysics for the last three hundred years is saturated with the idea of this equivalence. We speak of thought and of the brain indifferently, either considering the mental a simple epiphenomenon of the cerebral, as materialism does, or putting the mental and the cerebral on the same level, regarding them as two versions of the same original; this latter attitude is known as parallelism. The two clinical cases, referred to above, suggest thoughts bearing closely on this hypothesis. Taken literally, it seems a self-contradiction and it is contrary to all likelihood that Nature has indulged in the luxury of repeating in the language of consciousness what the cerebral cortex accomplishes in the form of atomic or molecular movement. Supposing

it **had** ever been produced, surely a consciousness which is only a **duplicate**, not intervening actively, would long since have disappeared from the universe. Further, in that our actions tend to become unconscious in the measure and degree that habit makes them **mechanical**, the general facts neither confirm nor suggest the validity of parallelism.

If mind be the same as cerebral activity, man cannot by any possibility think outside the limits of that cerebral activity. Again, if man **can** only think or have awareness in parallelism to cerebral activity, he cannot be aware that he is thinking within limits, as the **limits** of his thought are not recognizable as limits by his own efforts. For man to determine his own thoughts as limited, he must **have** an idea or awareness of thought which is not limited; this is tantamount to saying that man must have an idea or awareness of something outside his limits of thought. This is impossible and **absurd**. It is a matter of indifference in what world such a man **might** exist; his power of thought would still be subject to his **limits** of thought. There is left but one alternative for man and **that** course he adopts by determining his thought as relative, which **is** the same thing as limited. All man's thoughts are disintegrable into relative definitions, and so it comes about that our mind **is** aware that its knowledge is no more than relative knowledge, and man arrives at the knowledge of his own ignorance.

Superficial reflection suggests that cases of amnesia and aphasia, known to be associated with definite lesions of certain cerebral convolutions, are confirmative of memory being localized in the brain and corroborative of a kind of adherence of the mental to the cerebral life. A more profound study of a case of aphasia or amnesia shows, however, the impossibility of considering recollection or memory as so many records deposited in the brain, or even admitting the possibility that it can really be in the brain that recollections are preserved. An attentive study of the facts indicates that the characteristic cerebral lesions of the various forms of amnesia and aphasia do not touch recollections or memory themselves. The true facts seem to be that those lesions merely and really make the evoking of memory or recollections difficult or impossible; they concern the mechanism of recall and that mechanism only. To be precise, the function of the brain in these cases is to give the mind, when it has need of such a recollection, the power of obtaining from the body certain nascent movements or attitude, which offer an appropriate frame to the desired recollection. The cerebral organ prepares the frame; it does not

furnish the recollection. If the frame be there, the recollection or memory will come of its own accord to insert itself into it.

If we examine other functions of thought or confine ourselves to the particular case of memory, as suggested by the two clinical cases which were the starting of these musings, we are forced to the conclusion that the brain is charged with the task of impressing on the body the movements and attitudes which act what the mind thinks, or, better still, what the circumstances invite it to think. This conception is peculiarly well put by Bergson, who says: "The brain simply extracts from the life of the mind that which is capable of representation in movement. The cerebral life is to the mental life what the movements of the baton of a conductor are to the symphony. The brain, then, is that which allows the mind to adjust itself exactly to circumstances. It is the organ of attention to life. . . . But from this it results that one of the rôles of the brain is to limit the vision of the mind, to render its action more efficacious." From this point of view, except its sensorial functions, we can say that the brain is an organ of pantomime having no other part then to play the mental life.

The conception of pantomimicry, as applied to cerebral activity, is full of suggestion. We conceive, by it, how we insert ourselves in reality and how we adapt ourselves to it, responding to the call of circumstances by appropriate actions. Even if consciousness is not a function of the brain, we must admit that the brain maintains consciousness fixed on the world in which we live, or that it is the organ of attention to life. Thinking of the brain in this manner seems to be of importance; it enables us to understand why a cerebral modification, such as an intoxication by opium or alcohol, or even an insanity, may and often does involve a complete perturbation of the mental life. In these cases, the mind is not affected directly; neither need we believe that the patient raves because the poison has selected and damaged some mechanism in his cortex which is the material aspect of reasoning. The effect of the lesion is merely that the mechanism is thrown out of gear, and thought can no longer insert itself exactly in reality or things. Many intoxicated and insane persons can reason very logically, but their reasoning is outside reality, very much as we reason in a dream. By directing our thought towards action and bringing it to prepare the act that the circumstances demand, our brain confines our mind to channels or limits, thereby preventing us from being distracted by collateral attractions or turning to look back. We are impelled to look ahead in the direction in which we have to go and attend to the present.

These arguments do not mean that there is any real forgetting ; on **the** contrary, the facts are overwhelming that the past is preserved down to its slightest details. One has quoted already the man, rescued from drowning, who recalled memories long forgotten in **the** moment of what he realized to be death or, to use his own words, when he "had no interest in life." Here seems to be the clue to **the** whole problem ; the moment the attention to life grew weak, **then** the mind, which up to then had been kept looking forward, let go the tension and turned itself to look back and saw **the** past. These panoramic visions of the past are due then to sudden loss of interest in or attention to life and, in the case noted, were produced by the menace of sudden death. Until then the brain, so far as it is the organ of memory, had been keeping the attention fixed on life and all its purposive actions.

These conceptions as to the relation of memory to cerebration appear equally true of perception. Our sense organs and their associated cerebral centres control and limit influences from without, and thus mark the various directions in which our activities can be exercised. But, in so doing, they narrow our present outlook, just as the cerebral mechanisms of memory limit our vision of **the** past. The thought here arises, surely, just as certain inconsequent or dream memories may slip into the field of consciousness, availing themselves of a moment of inattention to life, may **there** not be around our normal perception a fringe of perceptions which, ever ready to enter into our consciousness, enter in certain exceptional or super-psychic individuals? This is but a thought, but it is a logical thought and one worth bearing in mind, when confronted with assurances otherwise unintelligible. We have to remember that it is space which creates distinctions in these matters ; our bodies are spatially external to one another and so are our minds, in so far as they are attached to those bodies. But if our minds are attached to our bodies only by a part of themselves, may it not be that for the remainder of them there is not this sharp distinction or separation. Without going so far as to think that personality is an ephemeral reality or a dependence on cerebral activity, it is conceivable that between various personalities continual exchanges may take place. If so, we can imagine that Nature has taken precaution to neutralize or throw back into the unconscious what would be awkward presentations for most of us in everyday life. One or more of these presentations may, however, at times pass through the guard if the inhibiting mechanism be functioning badly.

The musings in this note bring us near to the position postulated in the first section of this article for, the more we grasp the idea of a consciousness overflowing the organism, the more natural and probable appears the idea that the soul survives the body. As the facts and the thoughts on those facts compel one to regard the mental life as something more vast than the cerebral life, survival after death becomes so probable that the onus of proof rests with those who deny it rather than on those who affirm it. This position is all the stronger since the independence, however partial, of consciousness in regard to the body is a fact of experience.

III.

Not having read them for many years, one has recently enjoyed re-perusing the great classics of Darwin. Having done so, one is compelled to make the paradoxical assertion that the claims of science to universal dominion over the whole field of knowledge seem far more difficult to maintain now than they were before the publication of the great naturalist's theory of evolution on the hypothesis of the survival of the fittest. Further, the debt of philosophy to Darwin is almost as great as the debt of science. To many these may seem startling assertions but, before analysing the thoughts which suggest them, one would remark that the practical value of a scientific theory admits of being considered apart from the question of its truth. A present day illustration may make this plain. We are all familiar with the new physics and the mechanical conceptions based upon them; assuming they are correct and true, it is possible that they may have the effect of so complicating astronomy, without obtaining an approximation superior in practical value to that given by the classical celestial mechanics, that their superior convenience may still make it necessary to teach the latter although known to be incorrect or untrue. This is obviously a question of value, or a matter concerning philosophy and not admitting of disposal by scientific methods. One's thoughts tend, therefore, to a consideration of the value of Darwin's theory apart from the question of its scientific truth.

Any advance in evolution means the production of a fact of which the race has no previous conception. The wild game of Africa and other parts of the world could not have foreseen the introduction into their environment of "sportsmen" armed with breechloaders and, so long as the danger was not foreseen, no provision could have been made in Nature against their advent.

So, in our own case, the developments of evolution are neither conceivable in advance nor calculable, and we are unable to take measures to meet them. We are here confronted with what is the great defect in Darwin's hypothesis of the survival of the fittest, for we do not know what is the external correlative for which fitness in the organism is desiderated and, until we do know, we cannot define what we understand by the "fittest." Obviously, to attain complete fitness, we must be able to foresee all the forms which the future may evolve, and these to us are unimaginable. In spite of the expression "survival of the fittest" being without meaning, the value of Darwin's work remains because it effected a revolution in both our scientific and non-scientific beliefs, thereby advancing the evolution of thought. The revolution lay in the fact that, for an idea of universal flux or change confined within permanent limits, was substituted the conception of a universe arisen from an undifferentiated first principle by a process of differentiation which is still active and may be continued active for an indefinite future. Ideas of stationary change gave place to those of an orderly growth, and thought has been transferred from things as they are to their histories in the past and their potentialities in the future. This does not mean that questions of what we are have lost any of their importance; it merely means that they have been subordinated to new questions of how we became what we are, how we have survived, and why we present forms differing as much from primitive types as we differ from the amoeba. From this point of view, one is tempted to say that the outstanding merit of Darwin's work was not the solving of any outstanding biological problem, but the forcing into prominence a whole class of questions which had previously been unsuspected; thereby, first scientific and then philosophical thought was started along new and unexplored channels.

Owing to the new thought taking its rise in biology it has been employed mainly in respect of questions belonging to that branch of science, but its connection with questions of philosophy is not less obvious though, oddly enough, little realized. If our physical form and construction differ from that of a newt, toad or other simpler type, so also does our mental constitution differ in no less degree. Our mode of thought and our resultant beliefs admit, no less than our nervous system, of being dealt with under the Darwinian aspect of evolution; and this side of the process is of far greater importance to us than the physical, as human evolution is almost exclusively psychological. As civilized men, we differ

from savages much more in our mental than our physical development; our superiority is to be found not so much in our brains or nerves even if we could demonstrate any such superiority, as in our accumulation of scientific knowledge and our ethical beliefs. Further, our scientific knowledge, so far as it has been converted to use, is far more easily acquired by a savage than our ethical endowments.

Thus, a dispassionate survey of evolution, even as presented from the narrower standpoint of biology, makes one realize that it reveals no final redistribution of its constituent factors but forces home the belief that no such end is possible. The process it reveals is endless, or terminable only by a cataclysm or reversion to the point from which it started. In essence, evolution is the growth of opposite principles; man being a complex of conflicting tendencies, his welfare, so far as his advance in evolution is concerned, depends on the equal development of those tendencies, and the excessive growth of any one of them means the arrest of his forward evolution. It is doubtful whether there can be an absolute excess of any quality; when either of a pair of opposites, be they what we call good or what we call bad, falls into defect, then the whole process of evolution is checked. The demand asserts itself for a final end coupled with the question, what is the final end and how do these conclusions affect our attitude concerning the universal final end of our conduct? Without some final end there can be no values of the antecedent conditions, and yet there is nothing more certain than the existence of values. All values depend on approximation to a final end. To get out of this ethical difficulty, we must either accept the view that there is an indefinite number of unconnected final ends and simply sit still and twirl our thumbs; or we must reject the teaching of history, throw overboard our conscience and assert that pleasure is the final end; or we must assume that there is some final end external to the process of evolution and beyond the limit of our reason. Most of us do accept this last as the only way out of the difficulty, but of such an end no phenomenal attributes can be predicated. Within the animal kingdom, the universal final end seems to be the preservation of the individual in subordination to the interests of the race. With man, the universal final end becomes the perfection of the individual as an intellectual or reasoning being. This end man attempts to secure or advance to by the observance of ethical principles and rules which are the product of his conscience, and are paralleled in animal life by the numerous instincts which impel

animals to make provision for the needs of generations yet unborn. We, therefore, come to this : our value judgments when interpreted by the light of history, force on us the conception of a cosmic drama of which we know neither the beginning nor the end, nor the guiding principle. Our conscience alone dictates to us an interest in the drama and the part each one of us is to play, our self-consciousness assures us of our freedom to comply or refuse, and our philosophy or religion holds out a reward for faithful service. Practically, that reward is for each of us the real final end of our conduct, and the transcendental or unknown perfection of the individual is the purpose of evolution and, being external to the course of evolution, it may be realized or defeated at any moment and at any stage in the process.

As one sets these books of Darwin aside, the question suggests itself, can his great generalization or discovery itself be explained by reference to the law of survival? That is to say, was it the outcome of some accidental variation which favours its possessors in the struggle for existence? The attempt to find an answer is obviously to inquire what were the causes which produced the work as their necessary result. Here we encounter the initial obstacle that, without exact measurements, no necessary connexion can be established anywhere, and neither the work nor its antecedents admit of measurement. The only hope of an answer lies in an inquiry into the conditions under which that and other works like it have taken their rise. The favouring condition would seem to have been that political and religious freedom which came so prominently into being during the earlier half of the nineteenth century. This leads us to ask the meaning and conditions of that freedom and each step of the inquiry takes us farther and farther away from any scientific explanation ; for freedom depends on justice and justice on a belief in free will. The philosophic or ethical, as much as the purely scientific, value and association of Darwin's great generalization is manifest ; yet, how many of its readers have ever thought of the "origin of species" in this light?

One other thought suggests itself : how are we to account for the great appreciation in which Darwin's work is held, that many of us regard his books as but second to the Bible, and the honoured fame in which all intellectual civilization holds his name? The only answer is, because the work itself is a step forward in evolution. We are here face to face with that problem of ethical philosophy, the explanation of values and, possibly, the same answer explains the case of other discoveries or values, be they good or bad in any branch of thought. That we so explain the merit of this or any

other discovery is surely due to the belief that evolution supplies, what had formerly been wanting, a universal final end which does not contradict our value judgments while professing to explain them. Through and by evolution, we find not merely an understanding of why this or that creature exists in its present form, but we find possible an intelligent theory of conduct. Further, the more we contemplate evolution the more we realize that it has other values than the purely scientific.

IV.

Riding one day last cold weather out of the Kabuli gate of Peshawar city, my attention was attracted to two mendicants soliciting alms. Being in an altruistic mood, one gave them more than passing notice. One was a man of about forty who had lost both his hands, while the other was perhaps younger but quite blind from shrinkage and atrophy of both globes. Inquiries from some bystanders elicited the facts that the one man was a Malaghori and the other a Shinwari, both from across the border. The pair appeared to keep to each other's company and were well known mendicant cripples in the quarter. The handless man appeared to have been the victim of penal discipline in the days of the late Amir, while the other had lost his sight when a child during an attack of small-pox, probably the direct result of corneal sloughing. The pathos of the incident was obvious and, as one rode off homeward, thoughts came crowding through one's mind which it was impossible to suppress.

As one looked at one's own hands, one realized how pitiable must be the case of the man without hands. The more one looked, the more one found the true picture of man, the story of human advancement, the symbol of the world's greatness and weakness to be expressed by those eight digits, two thumbs and the muscular mechanism which formulated their movements. As an anatomist and a doctor, one thought of the first thumb and forefinger that caught the trick of thought, and all that is associated with the evolution from ape to man. Just as every hand wears a birth-seal and, by the lines of our thumb, each one of us can be identified from infancy to old age, so by the marks on the hand of the world is revealed its unmistakable personality; for do not the ability, firmness, and pertinacity of the human hand make all the welfare of the human race? The trustworthiness of the very reins between my fingers was the outcome of some pair of hands. I crossed the railway and saw a distant train, and there again the lives of all on that train depended on the hand that grasped the throttle lever o

the **engine**; nay more, the locomotive itself and the carriages it drew **were** products of the human hand. The realization of such responsibilities kindled the imagination and forced home the profounder thought that the destiny and the daily life of mankind depend upon countless pairs of obscure hands that are never lifted up in **dramatic** gesture to remind the world of their existence. It became **impossible** to hold back the thoughts which rushed through one's **mind**. One thought of all the wonders that the hand of man has wrought, one realized how the temples and the palaces, the art treasures of the world, the cunning masterpieces of mechanism, and even the crops following the ploughings and the sowings in the fields **near** by were all the effects of man's hand. One felt that all the acts of man show the hand alive, manifest, creating, destroying and **itself** the instrument of order and destruction. Let it move a rock or stone and the universe undergoes a readjustment; let it break a clod and new beauty breaks forth in a flower or fruit and the sea of fertility flows over the desert.

Upon the living hand of man hangs all our earthly well-being; every **industry**, every process is wrought by a human hand or by a **superhand**, a machine whose cunning fingers the human hand makes and uses. Even between these thoughts and the printed words which convey them to the reader there have intervened many **hands**. Again, if we think of our harbours, our canals, our telegraphs, our ships and our railways we see but the hand of man binding the waters with thought incorporate in arms of granite, or extending the grip of brotherhood between the nations, and making swift and strong the feet of messengers on man's service. With our hands we raise each other to the heights of knowledge and achievement and yet, with those same hands, we plunge each other into the pit. If anyone doubt this, think of the linotype printing presses, those digits of steel or huge derricks which rear our palaces and our factories, or the ocean greyhounds conveying incredible burdens across the seas, and think also of the warships and our heavy ordnance. The sentence is but a metaphoric word picture of hands triumphant in measureless enterprise yet wounding, making sore and suffering all injuries. It came home to one that, surely, there is nothing on earth like unto man's hand in its possibilities for good and evil. One tried to conceive a world inhabited by people without hands, but failed; unless provided with some new prehensile organ, such beings could produce nothing as we understand the needs of our race to be.

One thought all this and more, and yet but a few moments before one had left a human being devoid of hands, incapable of

any one of those efforts so typical of his race, a mere walking mechanism, a human derelict useless to himself or to others, and incapable of utilizing his physical strength to any creative action. Then, there was his companion ; a man with hands but sightless eyes. One thought of him and wondered whether he was in better case. By this time one had reached home, but in later hours of idleness the thoughts came back of the blind man. One shut one's eyes and supposed the lids would never open again, and realized the unspeakable calamity that had befallen. If true, then I must begin life all over again in a strange dark world, accommodating myself little by little to the conditions of darkness. I should have to learn my way about the house, with arms outstretched groping from object to object ; even my books would be useless to me. Out of doors, my feet would be shod with fear, for I should be menaced on every side by unseen dangers ; in a word, I realized myself as a human derelict adrift in the world, borne as the currents may chance to set "imprisoned in the viewless winds." One recalled the sense of lostness experienced years ago when caught in the darkness of an unfamiliar countryside or when, lost in the impenetrable fog of London, one heard the sounds of the traffic and scarce could tell whence they came, or where danger or safety lay.

Truly, a pitiable picture and yet exact for the poor wretch in the city bazaar and for many about us. Mentally, one groups the blind as either those who are rendered sightless in the midst of an active life, or those blind from infancy or later childhood. How many of us realize what blindness means falling on a man in the midst of an active life ? In spite of kindness and sympathy, such a man feels himself a burden, finds himself as but a helpless child, with the heart and mind, the desires, instincts and ambitions of a man. He has hands, but even with them he is in little better case than that other man deprived of hands, for his blindness bars every common way to usefulness and independence. Left without intelligent help, the blind man lives in a night of thwarted instincts and shackled ambitions. One wonders, to how many such sightless ones remains there a purpose, an object in life, a justification for living, or anything but a dreary course of existing for no reason except they cannot die. Such were one's thoughts, and little cheered by the remembrance of Homer, Ossian and Milton, who wrote great poems with no ray of light to their eyes ; or of Fawcett our one-time Postmaster-General, or of Euler the Swiss mathematician, or of Huber the naturalist and Thierry the historian. These men were all blind, and so was Didymus of

Alexandria the teacher of St. Jerome, also Diodotus the Stoic and teacher of Cicero; but each and all were men of exceptional capacity and energy. Other blind men have been musicians, carpenters, journalists and teachers, but these are the exceptions for not all the blind are gifted or intellectual, and few have the energy and perseverance necessary to overcome the heavy handicap they encounter at the start. Many among us think that the sightless have or acquire one or more senses in place of the one they have lost, and that the senses which of right belong to them are more delicate and acute than the senses of seeing people. It is not true, for there is no evidence of a compensatory sense development. Similarly, many think that Nature seeks to atone to the blind for their misfortune by giving them a special sensitiveness and a sweet patience; if this were true then surely it would be an advantage rather than an inconvenience to lose one's sight; but it is not true.

From the race betterment point of view, one conceives blindness in or from infancy to be worse than blindness in late childhood or adult life; it arrests development. Even in the best of homes, it is not possible to give the blind baby or child the special care, teaching and encouragement which it requires. Without these, the circumstances are all in favour of its growing up warped both mentally and physically. Fortunately, the number of these sightless infants is few compared with the cases where the sight is lost in later years. In these cases, as in the adult, there is a sudden shutting out from all familiar things, from games and the educative society of other children. The experience and incentive to action that come to us through the eye are arrested, a world of stimuli is lost and such a child ceases to imitate because he sees nothing to imitate, and of all things imitation is the most essential to growth. One conceives such a child deprived of impulses that pushed him to action, to be now bewildered and forced to form his world anew. In both the sightless child and the blind adult, a new sense must be developed that shall bring back the stimuli; that new sense is touch and the hands must replace the eyes. Given that super-sensitive hand, one conceives a world of blind people holding their own against the competition of their fellow men.

One wonders for what purpose the irony of Fate had brought together the two mendicants who suggested originally these reflections. Clearly, the handless man could in no way provide that which the sightless man so much needed, namely, hypersensitive and superlatively trained fingers. At most, he could be of help only by his eyes and warning speech. Conversely, what special help could the blind man be to the handless man, except

by virtue of superlatively developed hands, and these his parasitic existence on society and absence of special training under philanthropic effort did not provide. One may be wrong, but one is tempted to think that some unconscious working of the instinct of the reciprocal and compensatory action between the hand and eye may have impelled the handless man and the sightless man to consort specially together. If so and as things are in the world as we know it, the bargain or partnership would seem to be in favour of the handless man, as the seeing but handless man must play the rôle of director and manager in the combination, while the sightless man with hands would be but a hewer of wood and drawer of water under the other's direction and dominancy. If we picture a world peopled by such defectives, say, half without hands and half without eyes, we can conceive clearly the automatic social stratification which must and would ensue among them. The sightless, having hands, alone could be productive workers and ultimately must and would, by virtue of that industrial functioning, become the dominant class; the survival of the more fit would result in a gradual elimination of the handless race. These reflections raise an interesting series of conclusions, not the least being that which indicates the hand to be more important economically than the eye. Fortunately, the number of handless people in the world is very small but, for them, except as thinkers, talkers, and perhaps professional footballers, there is no place. For the blind, their future in the world is really a question of how well and how systematically their hands can be trained to work without the guidance of the eye. One reaches this conclusion by a semi-philosophical path but its importance is manifest in relation to the practical problem of what are we to do with our blind. The hand points to the hand, and urges efforts to increase the number of all possible lucrative occupations for the sightless. We know ourselves best how we each are contributing to those efforts; and, thus, the casual giving of alms to two unfortunates in an Indian bazaar and a contemplation of their physical disabilities has raised a train of musings which, though sad, are not devoid altogether of practical teaching. For the man without eyes there is room and place in the world, but for the man without hands there is no room, and it were better, perhaps, that he were dead. One cannot resist wondering whether the old Amir had reasoned this all out for himself long ago. Possibly he had, and possibly more than one unfortunate may still live to testify to the accuracy of that potentate's reasoning.

REPORT ON AN INVESTIGATION IN REGARD TO THE PREVALENCE OF MALARIA AMONGST THE TROOPS STATIONED AT KARACHI, 1913.

BY LIEUTENANT W. S. R. STEVEN,
Royal Army Medical Corps.

DURING the months of August, September, October, November and December, 1913, there were three hundred and eighty admissions for malaria to the Station Hospital, Karachi.

The detailed incidence of these cases was :—

	60th Company, Royal Garrison Artillery	101st Company, Royal Garrison Artillery	94th Battery, Royal Field Artillery	6 Com- panies, 1st York and Lancaster Regiment	6 Com- panies, 20th Lan- cashire Fusiliers	Other Corps	Total
August	1	..	3	13	..	..	17
September	5	1	6	29	..	2	43
October	4	..	18	92	..	4	118
November	1	1	12	64	9	1	88
December .. ..	..	..	2	6	104	2	114
Total	11	2	41	204	113	9	380

The object of this report is to attempt to determine the reasons for such an outbreak, and to furnish recommendations for the taking of measures sufficient to prevent the occurrence in future of a similar epidemic.

My investigations comprised :—

I. An inspection of all barracks and military lines.

II. A similar but necessarily less detailed inspection of cantonments.

III. A survey from an anti-malarial point of view of certain areas within municipal limits.

This was carried out with the help of the Municipal Health Officer, Dr. Schroff.

IV. The temporary care of all malaria cases in hospital.

I. (a) *Napier Lines*.—On my arrival in Karachi these barracks were occupied by the 1st Battalion, York and Lancaster Regiment. Mosquitoes were only found breeding in two places :—

(i) In a tank, and adjacent puddles, in the sisters' quarters compound, adjoining the Station Hospital. Variety at this time, *Culex fatigans*.

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(ii) In a catch-pit fed by a drain leading from No. 30 block (married quarters) just opposite the Detention Barracks. Here enormous numbers of *Culex* were discovered. These catch-pits abound in barracks, but all the others inspected had been most carefully attended to, and regularly emptied.

Just prior to my arrival two other breeding-places had been found:—

(iii) An underground drain passing beside the Mineral Water Factory was suspected by Captain Hewson, R.A.M.C., who had it ripped open, and it was found to be swarming with *Anophelines*.

(iv) A large "tank" on the south-eastern side of, and very near to, the Station Hospital, just outside the military boundaries, near the North-Western Railway, and under municipal control. This was found by Captain Collett, R.A.M.C., to be infested by *Anophele* larvæ. The ground surrounding this tank is most irregular and contains numerous hollows—"potential breeding-grounds," which are all full of water in the monsoon season.

The municipal authorities have promised to have these completely filled in, and some work has been done in this direction already. In the meantime the larvæ were destroyed by oiling the tank.

As to the presence of mosquitoes in barrack-rooms, institutes, etc., I could only catch a few *Culicines*, and the men were unanimous in stating that while a month before they had been much troubled by bites, especially in the bath-rooms, there were few, if any, mosquitoes in barracks at this time. There were *Anophelines* in small numbers in the hospital—probably coming from the tank above mentioned—as evidenced by the fact that several cases admitted with other complaints developed malaria after being over three weeks in hospital.

Sulphur fumigation of the barracks and verandas, when carried out, resulted in the killing of a few bats, sparrows and small insects, but practically no mosquitoes were found or destroyed.

(b) *Somerset Lines*.—*Anophele* larvæ were found in two places:—

(i) In a small garden swamp near married quarters. This was drained.

(ii) In three long cement troughs used for watering horses. Here numerous young *Anophele* larvæ were breeding, despite the fact that the tanks were supposed to be emptied several times a week. The non-commissioned officer in charge has now orders to completely dry out these troughs twice weekly.

It will be seen, then, that a sufficient local cause of infection existed to account for the incidence of malaria amongst the men of the Royal Field Artillery.

The arsenal was quite free from breeding-places. Here there are numerous large tanks full of water, stored for use in the event of fire. These are always thickly covered with kerosene oil.

(c) *Fitz-Clarence Lines*.—Absolutely no breeding-places existed here. The use of mosquito nets is generally enforced amongst the troops.

(d) *Supply Depot*.—Two large wells were found here, both very suitable as breeding-places. On being dragged with a sloping net they were found free from larvæ, owing, I think, to the presence of a layer of oil on the surface. These wells, and an adjacent cultivation area, need constant supervision. A large disused well, belonging to the North-Western Railway, at the back of these lines is a similar source of danger if not constantly attended to. There are no larvæ there now, but I think it should, if possible, be closed.

(e) *Transport Lines*.—Here water abounds in quantity, in troughs, irrigation channels, catch-pits, etc. These lines are most perfectly attended to, and are an example of what careful supervision can do in the prevention of mosquito-breeding. They are quite free from larvæ.

(f) *Rest Camp*.—The 20th Lancashire Fusiliers arrived here from Multan on November 11, 1913. I was put in charge of the camp on their arrival, and found it absolutely infested with Anopheline mosquitoes.

These I found to be breeding in a nullah running from the railway engine rooms along the west side of the camp. A bund had been placed across the stream a short distance below the camp, and the water was being deflected into a plantation on the west of the nullah, for irrigation purposes. On the upper side of the bund, and in the weeds below it, the water was swarming with Anopheline larvæ.

We knocked the bund away, to prevent collection of still water, and I brought the Cantonment Magistrate, Major Cumberlege, to see the nullah, which in part of its course was half filled with grass and weeds. He immediately had the whole course of the nullah weeded out by coolies, and the larvæ soon disappeared. The camp had, however, been infected, and the men severely bitten meanwhile, and I regard this stream as the direct cause of the large outbreak of malaria amongst the men of the Lancashire

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Fusiliers, the first case of malaria occurring almost exactly one fortnight after their arrival in camp. They remained sixteen days in this camp, and the zenith of the epidemic occurred about three to four weeks after their arrival in it. Nearly every mosquito in camp was an *Anopheles*, and by far the greater number of these were *Neocellia stephensi*, one of the proved carriers of malaria. A few *Cellia pulcherrima* and *Nyssomyzomyia rossi* were also found. This camp is a definite source of disease to any troops using it, as not merely is the stream to the west a source of malaria, but on the north side, on the eastern boundary of the North-Western Railway, there is a tank bounded on one side by a bank covered with refuse of all sorts, and native excreta. Here flies abound, and it appears highly probable that enteric fever might in this way be carried to the camp. On the road leading to the camp I found a small swamp under railway control, breeding *Anophelines*. I wrote to the executive engineer, who promptly had the whole swamp drained.

I have discussed the problem of the railway nullah with the municipal health officer, and the only feasible plan of getting rid of the surplus water—which at present runs towards Clifton Road and ends in a swamp—appears to be to have a large cultivation area formed in the site of the present swamp.

(g) *Manora*.—Practically free from mosquitoes and from malaria.

(II) *Cantonments*.—Within the cantonment limits mosquitoes breed, from time to time almost ubiquitously. Their favourite sites are the numerous catch-pits (for bath and other water), and garden tanks found in every bungalow compound.

Here *Anophelines* are rarer than *Culicines*, but *Stegomyia* abound. I have found catch-pits in bungalow compounds hatching out larvæ at the rate of probably fifty to a hundred per hour, the water being literally black with larvæ. I must say that I was struck with the mixture of ignorance and apathy with which otherwise intelligent people appeared to regard the mosquito problem. Many people complained bitterly of the pest of the mosquito, and never seemed to realize that the remedy lay in their own hands, and that they themselves were to blame for not frequently inspecting their compounds. Much the most important breeding-ground, however, in cantonments, from the military standpoint, is a stream which runs through the maidan at the rear of the Artillery Lines. [It had been reported to the cantonment authorities by Major C. H. Furnivall, R.A.M.C.]

During the monsoon this stream is a torrent. At other times it is small, and fed by subsoil water in the neighbourhood of the Ratan Tank, and also by a swamp under a bridge on the Bunder Road. Its sources are, therefore, in the municipal area, its course is within cantonment limits, and it runs into "Burn's Garden" which is again in municipal limits, and the water thence flows across the waste ground on each side of Kutchery Road, to the railway, and under the railway bridge on Queen's Road, and thence to the mangrove swamps. It is an example of one of many instances in which concerted municipal and cantonment action is needed. To windward of the Somerset Lines, it is most certainly *the great* source of infection of these lines and of all the adjacent bungalows, and probably indirectly of the Napier Lines and other more distant parts of cantonments. [There are several old wells near its course adjoining the Lascar Lines, which also breed mosquitoes, and should at once be closed down.] On my first inspection I found it a sluggish stream filled with weeds and with very irregular margins—a typical breeding-ground, and full of larvæ. Major Cumberlege, the Cantonment Magistrate, very kindly inspected it with me, and put a gang of coolies to work, to weed and trim the whole stream. For some weeks afterwards it was free from larvæ, but the banks get constantly trodden down by cattle, and unless this drainage, weeding and trimming of the banks is constantly renewed, larvæ are found to breed there. The Ratan Tank is being gradually filled in, but the stream cannot be similarly treated, as when the sub-soil water rises in the monsoon it becomes quite a large rivulet. As recommended by Major G. F. Stammers, R.A.M.C., in his report of August, 1912, I suggest the extreme advisability of making this nullah into a large cemented channel with small central bed, similar to that recently made by the municipal authorities in the vicinity of Clifton Road. Burn's Garden is apparently an ideal breeding-ground for mosquitoes, and although I have never found larvæ in the main channel which runs through the garden they undoubtedly do breed in the adjacent puddles, hoof-marks and small pools.

It is unnecessary to detail specifically the various tanks, catch-pits, and compounds in cantonments, bordering on barracks in which larvæ have been found, as these vary from week to week.

In general terms it may be said with absolute truth that *every* collection of still water in Karachi not frequently attended to breeds larvæ. I have verified this statement by inspecting at short intervals tins of water placed at random open to the air; these were always found to contain larvæ within ten days to a fortnight—a striking

proof, if such were needed, of the necessity of the most vigorous and constant inspection, by mosquito brigades, of all collections of water. Any scheme which does not entail supervision thorough enough to ensure such inspection must prove absolutely useless.

Up to the present the only measures in force for protecting the cantonment area from mosquitoes consist of a "mosquito brigade" formed of one soldier (formerly of the York and Lancaster Regiment, and now drawn from the Lancashire Fusiliers) and two coolies.

This "brigade" was confronted with the impossible task of inspecting weekly all military and cantonment limits and of keeping these mosquito-free.

Acting in concert, the Senior Medical Officer, Lieutenant-Colonel E. M. Hassard, R.A.M.C., and the Cantonment Committee have now drawn up the following scheme for 1914—based on a similar plan found successful at Peshawar, and formulated there by Colonel Skinner. Four areas are formed :—

(A) Napier Lines and Station Hospital.

(B) Somerset Lines and ordnance depot.

(C) FitzClarence Lines and station supply depot and transport lines.

(D) The cantonment area outside these lines.

A, B and C will be served by a mosquito brigade provided by the corps occupying these lines; (in the case of C by the Baluchi regiment soon to arrive in Karachi); each brigade to consist of a non-commissioned officer and three men—if necessary, specially trained men of the sanitary detachments. These brigades to be trained in anti-malaria work by the officer-in-charge of the brigade laboratory, or by a special officer on malaria duty.

D area will provide a separate brigade consisting of one inspector and three coolies, to be trained under orders from the senior medical officer, this number to be reinforced, if necessary, at special seasons of the year, as occasion arises; their duties to be specifically mapped out in a daily routine so as to ensure that every compound in cantonments is inspected weekly.

These brigades will carry out the ordinary anti-malaria measures of oiling tanks, filling in swamps, etc., which need not be here detailed.

Kerosene oil will be provided on indent locally, the bills to be paid in the case of D area by the Cantonment Committee's funds. D area's brigade will work under the supervision of the officer in charge of the brigade laboratory, or of a special malaria officer.

In order to secure the intelligent co-operation of the owners of bungalows, a circular, copied from one similarly used at Peshawar, dealing simply and emphatically with the life-history of the mosquito, its direct bearing on the malaria problem, its prevention, and the personal responsibility of the public in the matter, will be distributed to all dwellers in cantonments. It is suggested that just before the malaria season this year a popular lecture on the subject, illustrated by lantern slides, be given to stimulate interest in the matter.

These new arrangements should result in much more adequate supervision of barracks and cantonments than has heretofore obtained.

As far as I could judge from the state of cantonments on my arrival, the mosquito brigade was doing very little practical good. The Lancashire Fusiliers orderly at present employed is working conscientiously and well, and supplies me weekly with a list of larva-breeding compounds—now very few in number. The owners of these are warned, and a second offence carries with it a penalty of Rs. 30. It is hoped that in this way the public may be brought to look on the presence of larva-breeding tanks, etc., as a definite offence against the health of the community.

(III) *Municipality*.—In 1912, at the request of the Government of Bombay, Dr. Mhaskar undertook an "Investigation in Regard to the Prevalence of Stegomyia and other Mosquitoes in Karachi and the Measures necessary for their Control." The reason for this survey was the desire on the part of the Government to find out what likelihood there was of an epidemic of yellow fever arising in Karachi—should this disease reach the port, subsequent to the opening of the Panama Canal.

Although not bearing directly on the malaria question as regards the troops in this station, his report and recommendations contain much matter of definite help and interest, and have disclosed a state of affairs serious enough to arouse much interest—municipal and otherwise—and as the problem of Karachi malaria is shared in common by the military, cantonment, and municipal authorities, it is well to be able to record that Dr. Mhaskar's findings have had the effect of stimulating the Municipal Council to increased interest and expenditure on the question of malaria.

A special committee of the Municipal Council was formed and I was asked to attend its meetings. The reports of this committee show that much is to be done by: (a) Increasing the anti-malaria staff; (b) engineering works in connection with the filling in of the

various tanks (Rambaugh, Ratan, etc.), and the provision of more efficient drainage of swamps; and (c) the education of the native population by means of the distribution of leaflets and the giving of lectures. This last measure is to be assisted by the purchase of a bioscope lantern and series of films illustrating the life-history of the mosquito and the means at our disposal for its extermination.

The proximity of the Sadar Bazaar to barracks is, perhaps, the most important point in the whole problem from our standpoint. To windward of Napier Lines it furnishes a constant source of mosquito infection for these barracks. Secondly, its eating-houses are largely patronized by the men from these lines, and as during autumn mosquitoes abound in these, and in the Bazaar generally, it was found necessary to put the Bazaar out of bounds for the Lancashire Fusiliers during the height of the recent epidemic. This extreme measure is naturally unpopular with the troops, but until the municipal authorities' newly awakened energies have rendered the Bazaar free from malaria it is difficult to see how malaria can be stamped out from troops allowed to use these eating-houses. The men of the Royal Artillery do not appear to frequent the Bazaar very much, and it has been shown that opportunity existed for their becoming infected in their own lines. To a certain extent a similar opportunity occurred in the Napier Lines but not a sufficiently marked one—in my opinion—to account for the York and Lancaster epidemic, which can, apparently, be largely put down to the eating-houses in the Bazaar. At the height of this epidemic, Lieutenant-Colonel Hassard, R.A.M.C., found mosquitoes breeding in these eating-houses, but the York and Lancaster regimental authorities were averse to putting the Bazaar out of bounds, this action being only taken later by the Officer Commanding, Lancashire Fusiliers, on advice of the Senior Medical Officer.

Lieutenant-Colonel Hassard and I recently inspected the eating-houses and found them free from mosquitoes in the daytime, and no breeding-places existed in yards, gharras, etc.

There are numerous wells scattered through the houses in the various bazaars. The Municipal Health Officer tells me that of these twenty per cent have been found to contain *Anopheles*, and ten per cent *Culex fatigans*, and *Stegomyia fasciata*.

Also in nearly every house—owing usually to an inadequate tap water supply—there are numerous vessels used for storage of water, and in these, and in garden tubs, anti-formicas and gharras breeding is almost universal. Dr. Mhaskar's report emphasizes this point, and suggests as a remedy the provision of a better water supply—as regards quantity, the quality being excellent—and thus

making unnecessary the use of wells, tubs and gharras, the possession of which, he suggests, could then be made illegal, or legalized only by special municipal licence. The native population is largely ignorant and careless, but is not at all inclined to resent instruction and inspection by the health officer or his staff. The Sind Club is in municipal limits, and was for months infested by *Stegomyia*. The members all complained of this pest, and appeared quite oblivious of the fact that it was breeding out under their eyes in a long drain running through the compound.

The problem set before the Municipal Health Committee is a difficult one, largely owing to the height of the subsoil water everywhere, except in the garden quarter. The depths are :—

Sadar Bazaar, 6 to 7 ft.; Runchore lines, 8 ft.; jail quarter, 5 ft.; Bunder quarter, $3\frac{1}{2}$ ft.; Rambaugh quarter, 6 ft.; and garden quarter, 30 ft. The subsoil water rises greatly after the monsoon, and it would appear that Karachi is then for a short period almost a mosaic of puddles and swamps. The soil, however, is sandy and porous, and the heat of the sun is great.

The great increase in rainfall this year is naturally in general terms the direct cause of the great increase in malaria.

In various streams, pools, etc., which appeared excellent breeding-places, I have consistently failed to find any larvæ. I have noticed in each instance the presence of shoals of small fish. These I found in Burn's Garden, in the stream running thence to Kutcherri Road and the North-Western Railway, and in numerous pools all over the mangrove swamps occupying the huge waste area between Clifton Road, Queen's Road, the sea, and Kiamari. I captured some dozen of these fish and found that their capacity for eating larvæ, especially young *Anophelines*, was most marked. A dozen fish will devour about 150 larvæ in about half an hour. It is to be presumed, therefore, that the mangrove swamps and other mosquito-free areas owe their immunity to this fish, and I propose starting the experiment of placing them in garden tanks in the various compounds, in the hope that they may prove of definite use in the destruction of larvæ.

This fish lives in both fresh and strongly brackish waters. It is the species known as *Lebias dispar*, a well-known larva feeder. Specimens were sent for report to the Malaria Laboratory, Delhi, and have been there identified.

(IV) *The Character of the Actual Epidemic, Prophylaxis and Treatment.*—There is little to note as to the type of malaria fever amongst the patients in hospital, except the fact that the percentage of malignant tertian cases is higher than usual. Crescents

have been frequently found in the blood, and these cases were kept in bed for a fortnight, the treatment being quinine hydrochloride forty-five grains daily, and a small dose also daily, given before breakfast, of magnesium sulphate. In several very severe cases accompanied by acute vomiting, quinine was not tolerated at first, but in every instance after a thorough saline purge and rest in bed, it was found possible to bring the daily dose up to forty-five grains, given in small, frequently repeated amounts.

I introduced the "thick drop" method of blood examination and it was found that the labour of examining the very large daily number of slides was practically one tenth, while much greater certainty of finding the parasite obtained. Many slides contained scores of parasites in a single field.

A certain number of "three-day" and "five-day" fever cases occurred, marked by bradycardia and acute myalgic pains, and were diagnosed "sand-fly fever." A few cases of typical "seven-day fever" occurred with a distinct initial rigor, and fall on the seventh day by crisis, and these cases are believed by Captain Gregg, R.A.M.C., to be due to the *Stegomyia*, and closely resemble dengue symptomatically. It is strange that cases of sand-fly fever amongst the Royal Garrison Artillery at Manora are rare, as the *Phlebotomus* abounds there.

As regards *prophylaxis*, it is interesting to note that from the very first the Lancashire Fusiliers Regiment was regularly given ten grains of quinine on two consecutive days weekly. Its inadequacy as an efficient prophylactic is, therefore, very evident.

As recommended by the authorities of the Malaria Bureau at Delhi, I suggest that before the next malaria season the issue of quinine to the troops should be a daily one of five grains, which I am informed by the military authorities could easily be given at the morning Company parade, by the Company officers, under—if thought necessary—the supervision of regimental medical officers. In this way each man would always have a small quantity of quinine in circulation in his blood, which is exactly the condition to be aimed at, as an entering parasite is killed at once; whereas, if, in the case of a man protected by two ten-grain doses given on consecutive days, a parasite enters three or four days after the last dose, it finds—owing to the rapid elimination of quinine from the system—for three or four days, nothing to inhibit its development and reproduction, and is then only attacked by a quantity of quinine insufficient to destroy it in its increased numbers, and more mature stage.

The Officer Commanding the Lancashire Fusiliers is prepared

to supply mosquito nets to all his men—at a cost of about £250—but I advise that this measure be postponed, as the nets are not needed at present, and should be kept only for use during and after the monsoon season. If supplied now they would probably be torn and worse than useless when the mosquitoes revisit barracks next malaria season.

All cases of malaria in this regiment are to be housed in a separate block in barracks, on the leeward side of the prevailing wind, so as to lessen infection by mosquitoes blown into barracks from the Bazaar as much as possible. Also, in this way the Officer Commanding will be able to keep these men under observation, and ensure—by lightened duties as regards fatigues, marching, etc.—the restoration of perfect health and physique so necessary after the debilitating effects of malaria on a regiment. If possible they will be sent in detachments to recuperate in camp at Manora.

The question of the adequate supply of mosquito nets in hospital is a most urgent one, and as cases of malaria have developed in the non-malaria wards, I strongly recommend that a special supply of nets be at once provided so as to ensure that every case in hospital can, during the malaria season, have a net over his bed.

The following facts are noted as of interest:—

Culicidæ in Karachi.

The various species are:—

Culicines: Stegomyia fasciata, Culex fatigans, Culex concolor, Culex teniorrhynchus, Theobaldia spathia palpis.

Anophelines: Nyssomyzomyia rossi, Neocellia stephensi, Cellia pulcherrima.

Municipal distribution:—

	<i>S. fasciata</i>	Anopheles	Culex
Civil Lines, Frere Town	30 per cent	15 per cent	20 per cent
Ramabagh, Preedy and Serai	10 "	6 "	20 "
Garden and Lyari	4 "	11 "	20 "
Machi Meari	40 "	9 "	20 "
Kiamari and Harbour	30 "	3 "	40 "

The percentages are deduced from the ratio of the actual number of breeding-places to the possible ones of each class.

I have found the Anopheles breeding in almost every type of water. The Culex I have found in swarms in catch-pits full of water mixed with grease and soap from kitchen and bath-room. The Stegomyia appears to relish water rendered foul by decayed vegetation, and is frequently found in tiny puddles full of dead leaves.

Royal Army Medical Corps, Rouen Medical Society.

THE fourth ordinary meeting of the Society was held at No. 11, Stationary Hospital, Rouen, on Saturday, February 27, at 3 p.m., Colonel B. M. Skinner, A.D.M.S., Rouen, occupying the chair.

Mr. Struthers, of the Scotch Red Cross Society, was elected Treasurer of the Society.

The Chairman, in proposing a vote of thanks to Colonel Sir Berkeley Moynihan on returning to England, said that the Society, and in fact the whole Medical Service in Rouen, owed a very large debt of gratitude for all that Sir Berkeley had done during his stay in France. It was a matter of very great regret that other duties necessitated his return to England, but he hoped that in a short time they would be able to welcome him again, and that he would be heard many more times at this Society.

The vote of thanks was carried unanimously.

Lieutenant W. D. ARTHUR (No. 8, General Hospital) showed a model and diagrams of a splint that he had constructed for use after operations upon the knee-joint. The splint had the advantages of providing immobility of the joint combined with extension, and facilities for continuous irrigation with saline.

Lieutenant COPELAND (No. 8, General Hospital) showed a patient suffering from trophic changes in the left upper extremity due to the presence of a cervical rib on this side.

THE BACTERIOLOGY AND TREATMENT OF WOUNDS IN THE PRESENT CAMPAIGN.

Colonel Sir ALMROTH WRIGHT, in opening a discussion upon the "Bacteriology and Treatment of Wounds," said that practically every wound in the present war was infected. The conditions, therefore, were far worse than the ravages produced by any of the ordinary infective processes. The germs that were present could be divided broadly into two groups: (a) Pathogenic micro-organisms of the skin, including Staphylococci and Streptococci; (b) bacteria derived from faecal material. The important infections of wounds in this campaign were produced chiefly by three germs, viz.: (1) Streptococci, (2) *Bacillus tetani*, (3) *B. aerogenes capsulatus*, better termed *B. perfringens*. It was a mistake to think that the tetanus bacillus and *B. perfringens* were only present when symptoms of tetanus or malignant oedema respectively were present. They occurred far more commonly than was suspected and many wounds were infected by these bacteria. It was only when the concentration of germs reached a certain point that the specific symptoms developed, and the disease was recognized as such. Many

wounds were infected by these organisms, but in too small numbers to produce the specific disease.

The speaker next dealt with the use of prophylactic applications of antiseptics in the prevention of wound infection. Both the *B. tetani* and *B. perfringens* are anaerobic and spore-bearing, and very resistant to antiseptics. Furthermore the germs are carried too far into the tissues for any antiseptic to reach them. The muscles in many cases are ploughed up, and when the fibres contract, organisms are carried far out of reach of any local application. It is, therefore, impossible to expect local antiseptics to succeed, and he considered that the prophylactic application of these substances was doomed. By some it is argued that if it is impossible to kill all the micro-organisms it is well to kill some. He was not of this opinion.

Sir Almroth observed that the first stage observable after the infliction of a gun-shot or shell injury is the production of a "hæmorrhagic effusion." Infection of the blood and lymph in the track of the missile with the three germs already noted then occurs. The most important first step, therefore, in the treatment of all infected wounds is to open them freely and allow free drainage. If this is not done the germs will grow and after a time invade the tissues around the track. If the infecting agent happens to be the *B. tetani*, enough toxins may be produced to give the symptoms of tetanus. Similarly if *B. perfringens* grows in the effusion it will eventually invade the tissues and produce the symptoms of "gas gangrene" by blocking the lymph channels with gas. In a similar manner streptococcic cellulitis may ensue and spread with alarming rapidity. Often a double infection is present in the wounds met with in the present war.

If infection of the tissues has developed when the case is first seen, amputation may be required as an extreme measure, or free incisions and drainage if the condition persists. In the latter case the infection is not removed, but altered. It is, therefore, possible to recognize three distinct degrees of infection, viz.: (1) Infection of the hæmorrhagic effusion; (2) infection of the tissues; (3) surface infection and infection of open discharges.

Treatment by the application of antiseptic solutions has proved to be quite useless. A large number of cases in which the wounds had been systematically treated by iodine and undiluted carbolic acid respectively had been investigated at Boulogne. In some cases the surface was sterile, but, at a later date, the deep infection manifested itself and came to the surface. Many showed impending gangrene and the general conclusion formed was that powerful antiseptics had failed in their purpose.

The speaker next considered in some detail the reason why wounds should be freely opened up and drainage established. In healthy circulating blood bacteriotropic substances occur which act directly upon micro-organisms and kill them by simple chemical action. If

bacteria are collected in very large numbers it is impossible for the bacteriotropic bodies to deal adequately with the whole, and a "non-bacteriotropic nidus" is produced. This is the condition in a closed wound. In such a wound the fluid is stagnant: it does not change. Therefore no bacteriotropic substances are present. If drainage is established, the medium which is favourable to the growth of micro-organisms is let out and a new supply of bactericidal substances is introduced.

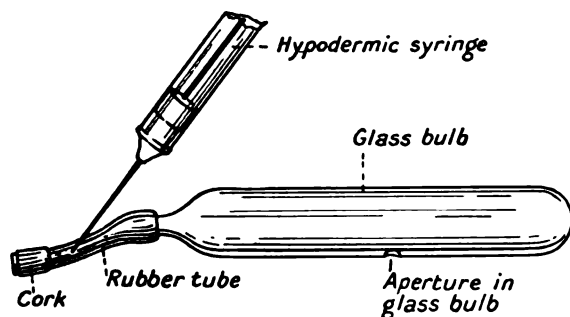
An abscess cavity may be compared to a "cess-pool." The fluid has no bactericidal properties and destroys white corpuscles. It is, therefore, a medium congenial to bacteria and inimical to white cells. By opening the wall of an abscess, this medium may be removed; but, on the other hand, germs still adhere to the walls of the cavity or sinus. The character of the fluid is not altered, and it is insufficient, therefore, simply to drain such a cavity. Not only must the escape to the fluid be established, but lymph lavage instituted. Drainage of an abscess cavity or sinus by itself is incomplete. Similarly to make incisions into a lymph-blocked tissue is useless. Some means for the production of lymph lavage must be instituted in addition. The simplest and best method is the application of osmotic power by means of a five per cent. solution of saline. In the case of indurated tissues all the interstices are blocked by white cells and coagulated lymph. Simple incisions into such a tissue will fail to produce the required result, until strong salt solution is applied to promote free drainage. If the lymph shows a rapid tendency to clot, the filter will break, and it is therefore expedient to introduce some substance which will prevent clotting. Such a body is citrate of soda in $\frac{1}{2}$ per cent solution. In gas phlegmon and streptococcic cellulitis it is not uncommon to find the infection spreading in spite of large incisions for drainage. The reason of this lies in deficient lymph lavage. A small incision, aided by a lymphagogue, will act better than a simple large incision, without osmotic power. A practical application of these principles is seen in the soap and sugar poultice commonly used by the lay public.

When a wound has been thoroughly opened up, in nine cases out of ten recovery occurs. In others, however, infection of the tissues takes place. This has been already noted as being the second stage of wound infection.

It appears to be the almost universal practice to wash out infected wounds daily with various antiseptic solutions. This is continued in spite of the fact that no advance is made, and that the discharge remains the same as ever. If a bacteriological examination of the wound is made under these conditions by a competent bacteriologist, exactly the same results will be found day after day. There is no alteration either in number or kind. In other words, washing out a wound with antiseptic solutions is useless, and ought to be deprecated. This statement does not

detract from the value of Listerism. The latter is purely a prophylactic measure, and not therapeutic.

In order to study correctly the pathological processes taking place in a wound, it is necessary to collect the discharge from one particular spot, and one only. If fluid or pus is taken from an ordinary wound, it is an admixture from all surfaces, and useless for detailed investigation. To obtain samples of pus from one area only, and to study the same from the day of its birth onwards, Sir Almroth Wright has devised a glass bulb which he terms a "pus leech." The bulb, which is shown diagrammatically in the adjoining figure, is rounded and closed at one extremity. It tapers at the other, and is attached to a rubber tube also closed by a tight-fitting cork. A small aperture is present in the side wall of the bulb, and this is applied to the particular area of the wound from which it is desired to collect the discharge. A vacuum is produced in the "leech" by inserting the needle of a hypodermic syringe into the lumen of the rubber tube, and withdrawing the air.



In an ordinary wound it is not unusual to find ten or eleven different micro-organisms present. If the pus is collected by means of a "pus leech," frequently only one germ is found. This is most probably a streptococcus. For these reasons a streptococcal antiseptic vaccine has been issued for use in infected wounds.

In the case of an ordinary boil or furuncle, fluctuation means disintegration of white corpuscles and the tissue trabeculae, probably owing to trypsin digestion, the trypsin being liberated from the white corpuscles. A medium extremely favourable to the growth of bacteria is thus produced, it having been proved experimentally that if small quantities of trypsin are added to blood, almost any micro-organism will grow. Normal healthy blood-serum possesses antitryptic power, and therefore if enough blood and lymph are drawn into the cavity of a wound or abscess, antitryptic power is immediately established. By fomentations alone it is possible to bring enough lymph to the tissues to destroy the

tryptic ferments present. In a deep wound, on the other hand, a vicious circle is present, because the fresh lymph is spoilt by contamination with tryptic bodies, frequent lavage of wounds with saline solution, opening up of all pockets, and free drainage are all means for destroying the baneful effects of trypsin and trypsinogen in these deep cavities.

An interesting point established by experiments with the pus leech, is that after a space of time white cells occur in the discharge, probably owing to an absence of chemiotactic power. It is quite possible that the fluid in an abscess cavity is a direct irritant to the wall. Metchnikoff and Pasteur have spent much time in studying the emigration of white cells in the living body, and particularly their reaction to various chemical irritants. If it were possible to study these effects *in vitro* much valuable information might be obtained. Sir Almroth Wright has devised a simple method for attaining this end by using a capillary tube containing centrifugalized blood. If a cylinder of ordinary blood clot is examined, it will be found that after a time hæmorrhage occurs from the clot. The latter contracts and red and white cells escape. In order to ascertain which corpuscles escape as a result of chemiotactic attraction, and which by mechanical forces, blood should be centrifugalized in a capillary tube. The distal layer then contains the red corpuscles, the middle the white cells, and the proximal portion the plasma. When a chemiotactic substance is placed upon the surface of the plasma the direct emigration of white cells can be watched. By this means it may be possible to ascertain which antiseptics attract white corpuscles and which do not. In fact the method opens up very great possibilities for the exact investigation of the processes involved in suppurating wounds, and of the best means to alleviate the same.

Professor TUFFIER, of Paris, continued the discussion, speaking in French.

Colonel Sir BERKELEY MOYNIHAN wished to thank the two previous speakers for the admirable speeches they had made. He felt that any remarks from other speakers would be out of place. Professor Tuffier was well known and for many years had attracted surgeons from all over the world. Perhaps those in England had acclaimed him most of all. They had, in fact, shown their appreciation of his work by making him an Honorary Fellow of the Royal College of Surgeons.

Referring to the work of Sir Almroth Wright, Sir Berkeley said that if it was impossible to pay one's debts it was always a good plan to acknowledge them. For many years the world had owed Sir Almroth a very great debt. Certainly in this War the medical profession could claim to have produced two very great heroes. One of these was Martin Leake; the other was Sir Almroth Wright.

Clinical and other Notes.

NOTE ON THE TREATMENT OF GUNSHOT INJURIES OF PERIPHERAL NERVES.

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It has been our experience that peripheral nerves may be affected as the result of gunshot injuries in several ways.

- (1) Complete destruction or obliteration of a nerve for a considerable portion, even inches, of its course.
- (2) Complete division.
- (3) Partial division.
- (4) Involvement in scar tissue.
- (5) Involvement in callus following compound fracture.
- (6) Pressure by a mal-united fragment, following compound fracture.
- (7) Pressure by a lodged bullet.
- (8) Bruising.
- (9) Traumatic hysteria.
- (10) "Concussion."

When the case is first seen the particular variety of injury must, if possible, be diagnosed, as on this will depend the treatment. In making the diagnosis five separate examinations are necessary:—

(1) EXAMINATION FOR PRESENCE OF DEFORMITY.

Very often we can tell at a glance which nerve is affected: thus wrist-drop indicates injury to the musculo-spiral nerve; claw-hand, injury to the ulnar; foot-drop, injury to the external popliteal; winged scapula, the nerve to the rhomboids; the mouth drawn to one side, injury to the opposite facial.

(2) EXAMINATION OF THE PATIENT'S POWER OF VOLUNTARY MUSCULAR MOVEMENT.

A systematic examination is made of all the movements normally possible, the patient being asked, say, to flex, extend, adduct, abduct, etc., as the case may be; inability to perform any of these movements points to the muscles probably affected, and so to the injured nerve. In making the examination it must not be forgotten that apparent complete paralysis may be due simply to disuse; we discover whether this is so by testing the electrical reactions (see (5)).

(3) EXAMINATION OF THE SKIN AND OF CUTANEOUS SENSATION.

When the nerve to an area of skin has been divided, either anatomically or physiologically for some months, trophic changes are produced in the latter, such as shrinkage, glossy appearance, loss of hair, formation of ulcers, &c. The finding of such changes in any particular part at once tells us that the nerve to that part is affected. Then again, certain nerves supply definite areas of skin with sensation; if such an area is found to be anæsthetic, the nerve supplying it must be injured. The whole skin of the affected part must therefore be tested for sensitivity to light touch and pin-prick. When the area of loss of sensation does not follow the distribution of a nerve, but is of the type known as "glove-anæsthesia," we know we are dealing with a case of hysterical paralysis. When our examination has shown that a group of muscles supplied by a nerve is paralysed, and that the sensation of the area of skin supplied exclusively by it is normal, we deduce that the injury to the nerve is only partial; on the other hand, when the group of muscles act normally, and the skin only is affected, we know that the nerve trunk has escaped, and that only its cutaneous branch has been damaged.

(4) RADIOGRAPHIC EXAMINATION.

This will reveal the site of fracture, the presence of callus, or the abnormal projection of a fragment of bone. It will also locate a lodged bullet.

(5) ELECTRICAL EXAMINATION OF THE MUSCLES.

For this purpose we have used a Lewis Jones condenser furnished with an arbitrary scale of twelve values or strengths. If when the electrodes are applied, a muscle reacts to one of the first four values, it may be said to be normal electrically, and the nerve supplying it is healthy; if only to one of the second four it exhibits the reaction of incomplete degeneration, and the nerve supplying it is partially injured; if only to one of the last four, complete reaction of degeneration is present, and the nerve is so badly damaged that no impulses whatever pass along it.

If a muscle does not react at all, even to No. 12, it is probable that the muscle is irretrievably damaged, apart from whatever injury there may be to the nerve. In practice this instrument has two chief uses: (1) To diagnose which muscles, if any, are cut off from their nerves; and (2) to test by observations made with it at fixed intervals of time, say every two weeks, whether the lesion is recovering, remaining stationary, or progressing.

TREATMENT.

(1) *Operative.*—When by the methods just outlined, we discover that a nerve is injured at a certain point in its course, and is not recovering, it is our duty to perform an exploratory operation at the earliest possible moment, which, as a rule, will be as soon as the skin wound has soundly

healed. A long incision is made, with its centre over the suspected point, and the nerve dissected out and dealt with as each case may require, either by freshening the severed ends and suture; or by excision of a neuroma and suture; or by freeing from scar tissue or callus; or by chiselling away projecting bone; or by removing a bullet or piece of shell. Whatever is done to the nerve, it is finally wrapped round with Cargile membrane to prevent adhesion to the surrounding parts, and the skin wound closed with clips.

(2) *Post-operative and Non-operative.*—Whether an operation is performed or not, the subsequent treatment is the same. It consists in keeping the paralysed muscles constantly relaxed by suitable splints, or other means, and in maintaining their tone by daily massage and individual electrical stimulation, until such time as impulses are again able to pass along their nerve to them. This may be any time from a few weeks to a few years.

PROGNOSIS.

This varies with each case. If there has been no actual anatomical division of nerve fibres, the outlook—provided any necessary operation has been performed—is very hopeful, and complete recovery in the course of from one to six months is to be expected.

But where nerve fibres have been divided, either at the time of injury, or at operation as in the excision of a neuroma, recovery cannot be expected for two or three years, and though partial recovery is common, complete recovery is rare.

In operating, therefore, a neuroma should only be excised where it undoubtedly involves the whole of the nerve; in all other cases the patient should be given the benefit of the doubt. If no recovery follows, the neuroma can always be resected later.

The distance the nerve lesion is from the periphery also affects the prognosis; the greater the distance the longer will be the period of recovery. Suppuration in the original wound is also said to make the prognosis worse, but it only does so indirectly by causing the formation of scar tissue.

The hysterical cases seem to follow no rule; one will get rapidly well under treatment, while another will remain quite unaffected.

The importance of after-treatment in these cases of nerve injury cannot be over-emphasized: if left alone and not kept under constant supervision, until recovery is at least nearly complete, the affected limbs will become in the majority of cases, useless appendages, contracted, shrunk and deformed.

Such treatment can only be carried out in an institution where the patients can attend daily, have their paralysed muscles stimulated, their instruments fitted and repaired, and careful records made of their progress.

It is to be hoped that a wise Government will realize this necessity,

and institute clinics throughout the country, where these and other crippled soldiers can slowly again be made useful members of the community.

The following fourteen cases, which we are enabled to publish through kind permission of Lieut.-Colonel Simson, R.A.M.C., Officer Commanding, Cambridge Hospital, comprise only those which have come to operation ; in addition we have had under observation or treatment between twenty and thirty others.

No.	Patient	Nerve affected	Condition found	Operation	Subsequent orthopaedic operation
1	Lce.-Cpl. W.	Popliteals (R. int. and ext.)	Completely divided	Sutured, 23.10.14	Jones'.
2	Belgian, B.	Upper trunk (R. brachial plexus)	Partially divided and involved in scar	Freed from scar, 3.11.14	—
3	Belgian, M.	Musculo-spiral, R.	Involved in callus of fractured humerus	Freed, 16.11.14 ..	—
4	Pte. W. ..	Brachial plexus (R., lower cords)	Involved in scar..	Freed, 3.12.14 ..	—
5	Pte. N. ..	Sacral plexus, L.	Bullet pressing on plexus	Bullet removed, 11.12.14	—
6	Pte. B. ..	Ulnar, L. ..	Involved in scar..	Freed, 11.12.14 ..	—
7	Sergt. B. ..	Ulnar, L. ..	Completely divided	Sutured, 17.12.14	—
8	Pte. B. ..	Musculo-spiral, L.	Involved in scar, with neuroma	Freed, excision of neuroma and suture, 25.1.15	Modified Jones'.
9	Pte. M. ..	Musculo-spiral, R.	Completely divided	Sutured, 27.1.15	Modified Jones'.
10	Belgian, P.	Musculo-spiral, R.	Involved in callus of fractured humerus	Freed, 29.1.15 ..	Modified Jones'.
11	Pte. M. ..	Great sciatic, L.	Involved in scar..	Freed, 5.2.15 ..	Jones'.
12	Pte. P. ..	Popliteal int., R. Popliteal ext. L.	Involved in scar.. Involved in scar, with neuroma	Freed Excision of neuroma, and suture, 6.2.15	— —
13	Pte. W. ..	Median, L. ..	Involved in scar..	Freed, 26.2.15 ..	—
14	Pte. W. ..	Ulnar, L. ..	Normal	Simple exploration, 22.3.15	—

Besides the exploratory operation on the nerve, a secondary orthopaedic operation has in suitable cases (1, 8, 9, 10, 11) been performed on the affected limb, to prevent wrist-drop and foot-drop. In Cases 1 and 11 this has been Robert Jones' skin removing operation : but in 8, 9, 10, the skin was merely pinched up into a fold, and kept so by a row of silkworm gut mattress sutures. As far as we are able to judge at present, this is a most satisfactory operation when performed at the wrist.

As regards the results of operative interference, we have to date only knowledge of recovery in three cases—5, 6, and 13. We hope in a later communication to be able to record the after-history of all these cases, with the results obtained. They are enumerated here to give an idea of the type of case met with, and of the operative treatment adopted.

Of these, Cases 1, 5, and 14 are of special interest.

In Case 1 a rifle bullet passed in and out behind the knee of each leg, injuring the left external popliteal nerve, and severing the right internal and external popliteals. The left external popliteal completely recovered in three weeks: it was therefore only "concussed," i.e., the passage of the bullet close to it caused a temporary loss of conductivity in it without producing any macroscopic lesion.

In Case 5 a bullet wound was received in the left buttock on September 14. Three hours later the man began to have great pain in sole of left foot, like toothache at first, and then "like a lot of mice biting it." On October 19, as there was no improvement, sciatic nerve was exposed, stretched, and injected with saline. (Lieutenant J. T.) This relieved the pain for ten days, after which it returned as bad as ever, the patient even threatening to commit suicide because of it. On December 11 the original gunshot wound was explored, and a hole found in the iliac bone; the finger introduced through this into the pelvis felt some shattered fragments of bone surrounding a distorted rifle bullet. The fragments and bullet were easily removed; when the patient regained consciousness after the anæsthetic all pain had gone, and he made an uninterrupted recovery.

In Case 14 the gunshot wound was received on November 7, 1914. When first seen in December, there was typical "claw hand," and loss of epicritic and protopathic sensation over one and a half fingers, suggesting damage to the left ulnar nerve. As examination showed that the injury was only partial, the case was treated by splint, and massage and movements. On March 3, 1915, as, except for the absence of deformity, he was no better, and he complained of pain in the scar whenever he used his hand, the nerve was explored, but was found to be normal. Though it is possible that the symptoms now complained of are simulated, in the absence of other evidence this must be regarded as a case of "concussion" in which the symptoms have been unusually prolonged.

REPORT ON THE THREE CASES OF SYPHILIS TREATED BY
SALVARSAN ON AUGUST 29, 1914, SHOWING UNUSUAL
REACTION, AND ONE OF WHICH PROVED FATAL.

BY CAPTAIN A. E. B. WOOD.

Royal Army Medical Corps.

Case 1.—No. 9902 Lance-Corporal Sidwell, 2nd South Wales Borderers, aged 30. He had received a previous injection of salvarsan at Peking on March 10, 1914, and nine injections of mercurial cream (Hg. 9 gr.) He had no active signs and received this injection of salvarsan (0.6 gm.) in accordance with paragraph 9 of the "Instructions for the Diagnosis and Treatment of Cases of Syphilis," dated July, 1913. On the previous evening he received castor oil 1 oz., and his bowels acted frequently. On the morning of the operation his urine was tested and found free from albumin. At 7 a.m. he was given half a pint of milk; he walked into the theatre. The administration was begun at 10.45 a.m., a tourniquet having been placed round the upper arm and the bend of the elbow painted with iodine. There was no undue difficulty in introducing the needle into the vein chosen and there was a slight flow of blood into the tube at the observation glass. The flow of salvarsan was very slow and took about forty minutes. Patient complained of some numbness in the arm under treatment, and a sensation of cold in the lower limbs, he also felt inclined to vomit before leaving the table. A piece of sterile gauze was placed over the wound, the needle withdrawn, the arm bandaged and the patient carried back to bed. He complained of cold and was covered with four blankets. He dozed for about three hours and then vomiting and diarrhœa set in. His temperature was 102° F., falling to 101° F. at 6 p.m. He was given plain boiled water and soda water in small quantities. He complained of severe headache. He was seen by Majors Hartigan and Waters and myself, the same evening. At 1 a.m., August 30, the patient was in a collapsed condition, temperature 95° F., pulse 130, respirations 29; brandy was given and hot water bottles applied; patient improved towards morning but did not sleep. At 9.30 a.m., I saw the patient, although he was somewhat better the vomiting and diarrhœa continued. No urine had been passed, there was very little dullness over the bladder, but I thought it advisable to pass a catheter, which I did with slight difficulty, drawing off one ounce only of thick, whitish urine, which proved to be slightly albuminous. He was ordered egg and brandy flips, four hourly. At 6 p.m. his temperature was normal, pulse 98, respirations 18. Vomiting was less but diarrhœa continued. At 7.30 p.m. I saw the patient again, no urine had been passed, but there was no abdominal dullness. Patient had a fairly comfortable night, no vomiting or diarrhœa since evening visit, but he only slept about two hours. At 6 a.m., August 31, temperature 98°, pulse 72, respirations 20, herpes now present on the mouth and lips. No urine

passed. At 9 a.m. a catheter was passed, but only a few drops of urine were withdrawn. Patient was fairly comfortable, no vomiting or diarrhoea. On consultation with the other medical officers it was decided to administer adrenalin, and at 1.20 p.m. adrenalin hydrochloride (1 in 10,000) dissolved in 5 minims of distilled water was given hypodermically. Temperature and pulse were practically normal. At 5 p.m. no urine had been passed and a further administration of 20 minims of adrenalin hydrochloride (1 in 1,000) in 1 drachm of distilled water was given by the mouth, this stronger dose being considered advisable. At 6 p.m. the patient passed voluntarily 15 oz. of urine, after which he felt much easier. A further dose of 20 minims of the 1 in 1,000 solution of adrenalin hydrochloride was given at 9 a.m. and again at 11 p.m. Forty-five ounces of urine were passed during the night. Patient slept well. September 1.—Temperature, pulse and respiration normal. Bowels not moved since yesterday morning. Egg-flips with brandy omitted, beef tea, weak tea and milk were given. The adrenalin solution was administered at 2, 6 and 10 p.m. Patient had a good night. September 2.—Temperature normal; bowels not moved; cascara sagrada liq. mixture given. Bowels moved at 6 p.m. Some abdominal pains complained of and fomentations applied. September 3.—Patient had a good night and spoke of feeling hungry, custard, milk, beef tea and calves'-foot jelly were given. Patient much better except for slight pain in the abdomen. September 4.—Patient continuing to do well and allowed up for a little while. Complaints of feeling rather weak. September 9.—Patient is still complaining of slight weakness. Discharged to attend hospital.

Case 2.—No. 10735 Private G. Lloyd, 2nd South Wales Borderers, aged 24. Service five years. This man had also received a previous dose in Peking in February, 1914, and nine weekly injections of mercury, one grain. Patient, also, had no active signs and was treated under similar circumstances to case 1. The patient was prepared as in the former case, except that the oleum ricini was given at 12 midnight, because the patient came late to hospital. Bowels moved frequently. On the morning of the operation, the urine was tested and found normal. The administration was successfully carried out, lasted about twelve minutes, and no unusual symptoms were observed. Patient was carried back to bed and extra blankets applied. Vomiting and diarrhoea began about four hours after. Temperature at 4 p.m. was 102° F., at 10 p.m. temperature was 100° F.; pulse 100 and respirations 20. Diarrhoea and vomiting was still troublesome during the night. August 30.—Vomiting and diarrhoea better at 6 a.m.; temperature 100·8° F.; milk and weak tea given. At 10 a.m. temperature the same; diarrhoea decreasing. At 6 p.m., temperature 100·4° F.; pulse 90 and respirations 18. Herpes began to appear about the lips, nose, mouth and tongue. Patient had a restless night, herpetic eruption causing considerable irritation. Patient vomited once during the night. Urine was passed normally. August 31.

—A 6 a.m. the temperature was 99·6° F., pulse 82 and respirations 20. At 6 p.m., temperature 100·2° F. The eyes had a curious glistening appearance, pupils dilated and some conjunctivitis present. Adrenalin hydrochloride (1 in 1,000 solution) 20 minims given by the mouth at 7 p.m. Shortly afterwards patient passed 45 oz. of urine. Patient had a good night, perspired freely, no vomiting or diarrhoea. September 1.—At 6 a.m. the temperature was 99·4° F.; pulse 80; respirations 20. Herpes of the lips and mouth more marked. Treated with glycerine and borax and frequent bathing with hot water. Adrenalin hydrochloride (1 in 1,000) 20 minims was administered at 2, 6, and 10 p.m. At 6 p.m. the temperature was 100·6° F. Patient had a good night. September 2.—The temperature at 6 a.m. was 99·2° F. Egg-flips taken well, no vomiting or diarrhoea. At 6 p.m., the temperature was 99·6° F. Bowels normal. Patient had a good night. September 3.—At 10 a.m., the temperature was 99° F.; pulse 58 and respirations 18. At 6 p.m., temperature normal. No adrenalin given since September 1. Patient doing well. September 9.—Patient discharged to duty.

Case 3.—No. 10366 Private P. Cox, 2nd South Wales Borderers, aged 23.

Previous History.—Patient was admitted to hospital at Tientsin, on June 27, 1914, with a large indurated sore on the body of the penis. No examination for *Treponema pallida* was made. The sore was treated with pure carbolic, lotio nigra and local baths. On July 27, the sore had healed and the patient was discharged from hospital to attend weekly for observation. On August 20 a macular rash was noticed, slight at first, which the patient attributed to bug bites. On August 24 a definite diagnosis of syphilis was made and the patient admitted to hospital. On August 27 the patient attended the medical inspection room with other syphilitic patients. The macular rash was then noticed on body, limbs and face, the mucous membranes were unaffected, with the exception of a small mucous patch on tonsil. The lymphatic glands were shotty. No mercury was given, but the patient's name was taken for the administration of salvarsan at the earliest possible opportunity. Patient was sent back to hospital and a course of iodide of potash ten grains three times a day ordered. On Saturday, August 29, salvarsan 0·6 grm. was administered intravenously, after two other cases had been similarly treated. On the previous evening oleum ricini one ounce had been given, the bowels subsequently moving four times. On the morning of the operation the patient received half a pint of milk at 7 a.m., and the salvarsan was administered at about 12.30 noon.

Condition of Patient before administration of Salvarsan.—Patient was a muscular, well-nourished man of medium height. Heart and lungs apparently healthy. There was a profuse raw ham colour macular rash on the body, face and limbs, especially marked on the face, where the spots were somewhat raised and flat on the top. On the limbs in places

they showed signs of desquamation. The usual injection of 0.6 grm. of salvarsan, neutralized, dissolved in distilled water and normal saline solution added to 250 c.c. was injected into one of the veins on the inner side of the bend of the elbow. The administration, terminated by a few cubic centimetres of normal saline solution, lasted about twelve minutes (about the average time).

Condition after Administration of Salvarsan.—Patient was carried back to bed on a stretcher and remained quiet, no symptoms were noticed until about 4 p.m., when the rash appeared to be more pronounced. The temperature was 103.6° F., and patient began to vomit. Between 4 and 6 p.m., the bowels moved frequently, and urine was passed. At 6 p.m., the temperature was 103.8° F. During the night the patient slept a little, but vomited frequently bile-stained material, and also complained of some pain in the abdomen. Turpentine stupes were applied which gave relief. On August 30, temperature at 6 a.m. was 97.8° F., and at 7.30 a.m. some warm milk was given. Temperature at 9 a.m. was 99° F. Patient vomited twice during the morning.

During the afternoon and the evening he appeared much brighter. At 6 p.m., temperature was 101° F., at 6.45 p.m. he was seen by Major Hartigan at his evening visit, and by Major Waters who happened to be in the hospital. He complained of slight pain and was ordered turpentine stupes by Major Hartigan, R.A.M.C. At 7.45 p.m., I, myself, saw the patient, as I had gone to the hospital especially to visit the three salvarsan cases; he continued to complain of slight pain in his abdomen, but said it was not very severe but was afraid he could not sleep, so I ordered him potassium bromide twenty grains. He then showed no alarming symptoms. At 8.35 p.m. he complained of severe pain in the abdomen and while a stupe was being prepared he suddenly expired. The potassium bromide was not given. I was at once telephoned for and reached the hospital at about 8.50 p.m. The patient was then quite dead, lying with his left hand raised above his head on the pillow. A post-mortem examination was made on August 31, at 9 a.m.

The body was that of a well-developed man, well nourished and of medium height. Hypostatic congestion marked posteriorly. A pronounced macular rash on body, limbs and face, especially on the face, spots circular, raised and flattened on the top; left testicle enlarged. On opening the chest a small quantity of frothy yellow fluid was noticed on the surface of the pericardium, and a slight excess of fluid within. Heart 12½ oz., very pale, fatty and flabby. Small punctate hæmorrhages could be seen immediately beneath the epicardium, giving the appearance of a "thrush's breast," most marked in the left ventricle, but present all over the base of the heart and also on the appendices auriculæ and the wall of the aorta. Lungs: No adhesions; right lung 23 oz., left lung 22 oz., both congested. Liver: Weight 51½ oz., very pale, bile-stained (dark green) on lower margin, most marked over the right lobe;

gall bladder containing bile. Spleen: Enlarged, of abnormal shape, acutely pointed at upper end; weight $9\frac{1}{2}$ oz., congested, very soft and friable. Kidneys: Right kidney $5\frac{1}{2}$ oz., left kidney $5\frac{1}{2}$ oz., normal in appearance, capsule non-adherent. Bladder: Normal in appearance, empty. Brain: On opening the dura mater the surface of the brain was noticed to be markedly congested and the superficial blood-vessels greatly dilated. On making sections of the brain substance, the interior of the brain appeared normal, but the whole of the surface extending over each of the lobes showed marked dilatation of the superficial blood-vessels constituting the condition known as encephalitis hæmorrhagica (Ehrlich). It was concluded that death was due to this condition. Other organs of the body were normal. Smears were taken from the surface of the brain for examination for *Spirochaeta pallida*. The smears were stained by the Giemsa's method and *S. pallida* were discovered.

RESUMÉ.

In considering the foregoing cases certain features are of interest:—

All three suffered much more severely after the injection than any I have previously treated. This naturally points to the presence of some unusual condition connected with the drug or its administration, rather than of any idiosyncrasy on the part of the patient. Bearing this in view, I have gone carefully over the whole procedure from its commencement and have summed up as follows:—

The phials or capsules were in sealed cases opened by myself as each was required. The phial showed no sign of crack or damage, which might have permitted deterioration of its contents. The distilled water was prepared the previous day by Dr. Thorpe's method, the saline solution (0.5 per cent) was prepared on the morning of the operation, and both that and the distilled water, after filtration, were boiled.

Except for the following minor points of detail, the procedure was the same as that adopted in all previous cases.

First.—In Case 1 the administration lasted nearly forty minutes, instead of twelve minutes, the average duration. This may have been due to partial blocking of the needle with blood-clot, or impaction of the point against the wall of the vein; short of withdrawing the needle, I tried to rectify this but without success. This case was the only patient whose condition subsequently gave cause for alarm.

Second.—In Case 2, as I was called away, the solution was allowed to stand about five minutes in the Erlenmeyer's flask, which was plugged with sterile wool. On my return I added the neutralizing agent (NaHO). This case, however, was the least affected of the three, so that any consequence of this delay appears to be negligible.

Third.—Case 3, the fatal case, though suffering from diarrhœa and vomiting, like the others, had no anuria like Case 1, and gave no cause for uneasiness until he suddenly expired. The duration of administration

in Cases 2 and 3 was about twelve minutes. It was Case 1 which gave cause for anxiety, both on account of his collapsed condition during the night, and also on account of his anuria, which only yielded on the exhibition of adrenalin which acted like magic.

Comparing the Cases.—Cases 1 and 2 had both received salvarsan 0.6 grm. previously. Case 3 had received no treatment beyond potassium iodide 30 gr. daily for about three days previously, with a view to modifying any degenerative changes which might be taking place in the arteries. He was covered with a profuse rash, but there was no indication of any idiosyncrasy to the action of arsenic, and accordingly the prophylactic administration of adrenalin, so strongly recommended, was not indicated.

In regard to the use of adrenalin, advocated by Milian (Paris), I should like to add my testimony to its value. In case 1 where no urine had been passed for twenty-four hours, 20 minims of a weak solution (1 in 10,000) was injected subcutaneously at 1.30 p.m. and at 5 p.m. a dose of 20 minims of 1 in 1,000 was given by the mouth, an hour later the patient passed 45 oz. of urine. I continued the administration of the drug by the mouth in the same doses two hourly for the first day and four hourly on the second. Adrenalin was also administered to Case 2.

The *post-mortem* examination in Case 3 showed a great dilatation of the vessels on the surface of the brain, a condition described by Professor Ehrlich in an article in the *British Medical Journal* of May 9, 1914, and to which he has given the name of encephalitis hæmorrhagica. He says: "The dilatation of the vessels is, in my opinion, in close connexion with the salvarsan injection." He also speaks of the formation of an extremely toxic oxidation product (paraminoarsenoxide) "favoured by all forces which cause a delay in salvarsan excretion," but this would apparently occur later; in this case death occurred about thirty-two hours after the injection.

In addition, he speaks as follows of another factor which he thinks may be *the most significant*: "The irritated vessels only undergo dilatation of so colossal a character under the influence of the arsenical substance, when the normal regulator of the vascular system, adrenalin, is present in insufficient quantities in the blood." As I have previously shown, adrenalin was given with great benefit in Cases 1 and 2, but in case 3, there being no indication for its administration before the sudden and fatal result, none was given.

In regard to this case, which was an early secondary one, further remarks of Ehrlich are particularly interesting, "the patients specially threatened with encephalitis hæmorrhagica are, as is known, those in whom the brain in the *early secondary period* of syphilis is flooded with spirochætes." Smears from the brain of this case treated by Giemsa's method showed spirochætes present. In these cases Ehrlich says: "A thorough course of mercury should precede the salvarsan treatment, and the dose chosen for the first injection should not be high." The difficulty appears to be to recognize these cases beforehand. Except for the

profusion of the rash there was nothing in this case to suggest any unusual features. The condition of the heart, which showed epicardial petechial hæmorrhages, is worthy of note, and in this connexion a death occurring in Guy's Hospital and quoted in the *British Medical Journal* of May 2, 1914, is of interest. Here in addition to bleeding in other organs, petechial hæmorrhages beneath the pericardium were present.

A NEW PATTERN STRETCHER.

BY LIEUTENANT C. HAMILTON WITHERS.
Royal Army Medical Corps (T.).

THE new pattern stretcher (figs. 1 and 2), particulars of which are given below, has been designed for use more particularly in those cases where the patient is liable to experience, in transit down line of communication, considerable pain or discomfort when of necessity he is repeatedly lifted on and off the regulation stretcher, which, owing to its length, etc., may not be placed directly into (or, in the majority of cases, even on) the cot in hospital or on shipboard. It is also pointed out that the width in the case of this new stretcher may be reduced from the standard to a given minimum without unloading, which greatly facilitates the transport of the patient through passages, railway carriage doors, and confined spaces generally. Fig. 1 illustrates the "traverses" locked at the reduced width by the use of pins, which are attached to the bars by means of chains.

The stretcher, as will be observed from the illustrations, consists of two parts, i.e.: (a) the frame complete; (b) the loose canvas bed. The total weight of the stretcher complete, with its special metal fittings, reinforcing plates, etc., is approximately 21 lb. only.

The frame is so constructed that the handles can be pushed home (fig. 2), giving a total overall length not exceeding five feet nine inches, which length at a trial on a hospital ship recently proved amply sufficient for a man six feet two inches in height. The special metal feet also, with the utmost ease, collapse on release from the trigger and fold up flush against the poles—thus enabling the frame with the traverses eased to be placed directly over the patient, who it is assumed is resting upon the loose canvas bed mentioned above. This canvas "bottom" (which has been placed under the patient in the same manner as a sheet) is now readily fastened to the frame by means of the eyelets and spring hasps illustrated—see figs. 3 and 5—and the traverses having been pressed home the patient is ready for removal.

The "bottom" or bed was originally made of the Army regulation canvas, but it has since been found more satisfactory to employ a somewhat smoother material. In any case the canvas "bottom" is strengthened by the use of web bands which extend beyond the bed and serve as hand grips (see fig. 2).

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The bed may extend either the full length of the closed stretcher, i.e., from "A" to "C" (fig. 1), or from "A" to "B" only. In the latter case two loose straps (alternatively used for the purpose of binding up stretcher for transport) are employed as supports between "B" and "C."



FIG. 3.

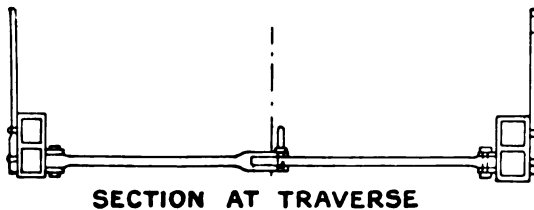
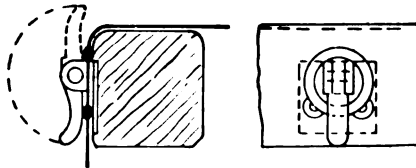


FIG. 4.



SPRING CLIP HASPS FOR HOLDING CANVAS.

FIG. 5.

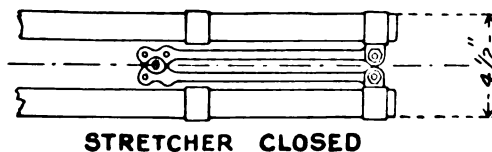


FIG. 6.

The canvas bed may be placed under the patient at the outset, i.e., in the field or at the casualty clearing station, and the patient carried down the lines of communications through to the general hospital on the same "bottom"; this being rendered possible by medical units on the lines of communications, namely, casualty clearing stations, ambulance trains, stationary and general hospitals, also hospital ships, each having as part of their equipment one or two frames with an adequate supply of beds.

The supply of "bottoms" at the front would easily be maintained by simply arranging that the relieving unit should pass up, in exchange, a loose one when taking over the patient for whom it had been found

expedient to employ this special method of transport. By this means units would always, at least theoretically, have their full original issue on hand.

The canvas "bottom," it will be noticed from figs. 1, 2, and 3, carries two sets of eyelet-holes—the outer giving the regulation width, whilst the inner rows are intended for use when the stretcher is being permanently employed in confined spaces, or in the event of the canvas sagging appreciably in wear.

In spite of its manifest advantages and its apparently (from illustrations) complicated nature, this stretcher is but little more costly than the regulation pattern, whilst in actual practice it is a perfectly simple and efficient contrivance.

APPARATUS FOR THE UNLOADING OF SICK FROM HOSPITAL SHIPS, ETC.

BY LIEUTENANT C. HAMILTON WITHERS.

Royal Army Medical Corps (T.)

THE apparatus described below has been designed with the idea of facilitating the landing of sick from shipboard, and of reducing to a minimum the suffering to which the wounded are liable under the present antiquated method, owing to the shaking and jolting which is meanwhile more or less unavoidable. It is further pointed out that the adoption of this system would render it possible to unload a ship expeditiously with a considerably less number of bearers than is at present essential, and, in addition to the economy effected in this direction, the men employed would be obviously working under far less strenuous conditions.

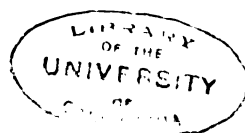
The smooth running of wire ropeways is, of course, universally acknowledged, and it is therefore unnecessary to argue this fact in support of the system described herein.

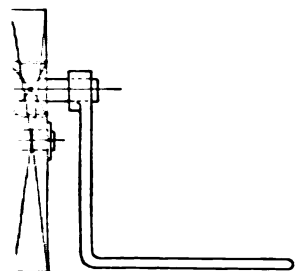
The first two illustrations given are reproductions of the original drawings submitted to the authorities, whilst the remainder depict the plant as actually supplied. Fig. 1 shows the proposed method of working on a vessel of sixty-two feet beam at top of tide, whilst fig. 2 indicates the method it was suggested should be employed in the case of a vessel of forty-five feet beam at low tide.

The apparatus as actually installed consists primarily of wire ropes, which, supported on trestles fitted with rocking saddles, etc., run from the ship to the shore, extending right up to the train side, or such point of discharge as may be considered expedient.

As will be observed from fig. 3, the ship's portion of the plant consists of the necessary wire rope, the live tension winches (fig. 4) which take up any strain or slackness of the rope caused by the vessel rising and falling with the tide, etc.; also two trestles, one of the latter being fitted with small hand winches for controlling "whips."

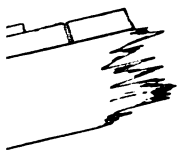
The amount of tension required on the rope, which extends from the tension winch to anchorage on the shore beyond trestle "A," is





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twenty-five to thirty hundredweight, and this tension is obtained and secured by means of gearing and balance weights (see figs. 3 and 4); the weights are arranged round a hook bolt to facilitate handling, and are flat and weigh approximately twenty-eight pounds each.

Each rope carries twelve runners complete with rope slings (see figs. 5 and 6), the wheels—two—being so grooved as to pass readily over the rocking saddles with which each trestle is fitted. Further, each runner carries a contrivance which automatically releases the "whip" or hauling rope on passing trestles "E" and "F."

The hangers (see fig. 6) are fitted with leaf springs to take up any shock when riding over saddles, and on the ends of each spring are fitted "adjusters" through which the slings are threaded, the object of the "adjuster" being to permit of the patient's head being raised or lowered with the minimum of trouble. A further feature with this adjuster is that owing to its construction, the correct level having been obtained, the rope is automatically locked in that position immediately the weight of the stretcher is taken up by the slings.

The slings, as will be observed, are constructed to slip over the handle or legs of the stretcher, but an even more satisfactory method is for each stretcher to have hooks attached to the handles, by no means a costly matter.

The "whips" or haul ropes mentioned earlier in this article need only to be brought into use when owing to the state of the tide the gangway is on a more or less acute angle.

The rope from the foot of gangway onward is so "set" as to give a slight downward gradient to the shore anchorage, which reduces the energy required to propel the loaded stretcher to the absolute minimum.

The whole of the shore tackle is portable and can be moved from one door to another when necessary, without the least trouble; further, a boat coming alongside has only to throw out her wire line for anchorage ashore, and all is then ready to commence unloading.

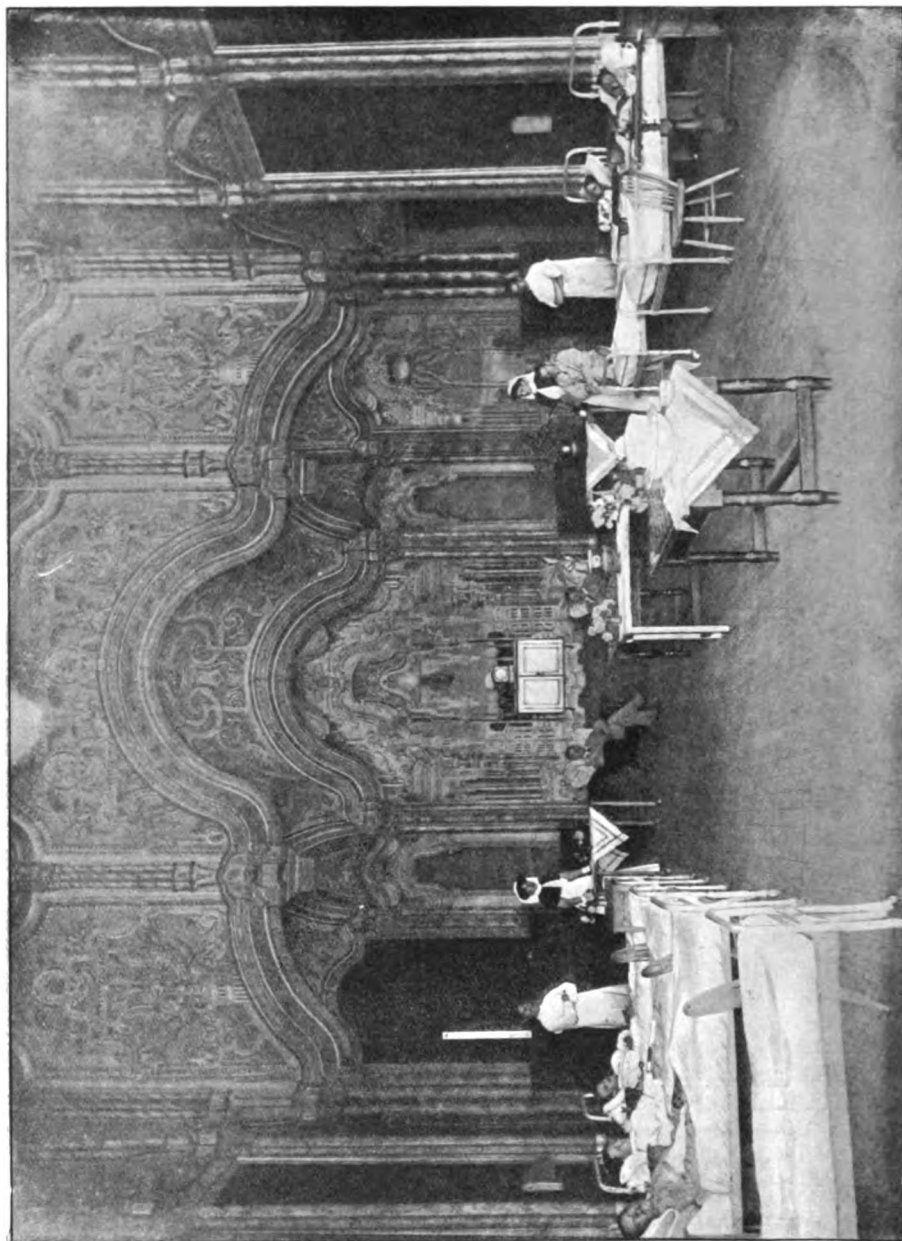
A NOTE ON THE CITADEL HOSPITAL, CAIRO.

BY CAPTAIN L. B. CANE.

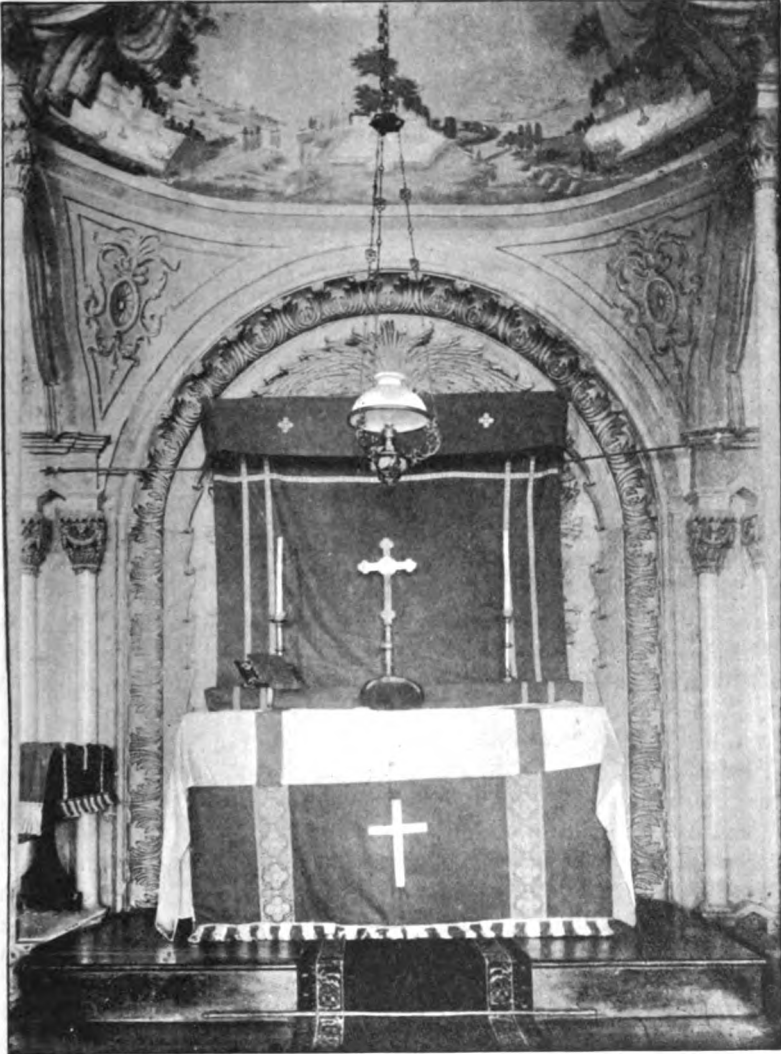
Royal Army Medical Corps.

THE principal military hospital in Egypt occupies what was formerly a palace of Mohammed Ali, within the walls of Saladin's ancient fortress that dominates the capital. This, to-day, contains four hundred beds, most of which are occupied by Territorials from the East Lancashire Division, including some who were wounded during the defence of the Suez Canal against the Turks.

The hospital is unique both in its situation and structure, but very little of its history or former greatness seems to be known. Neither the



Arabic museum nor the famous Khedival Library in Cairo seem to contain any record of its building, nor have I found any but the barest details of its history prior to its conversion into a military hospital in 1882.



Hospital Chapel, formerly Bath of the Harem.

Since then constant improvements and renovations have done much to mar its former beauties. Every year sees some alterations, and the frescoes that formerly covered every wall and ceiling are gradually

being painted over or destroyed. Some description, with illustrations, of its present condition, with extracts from the official account of its conversion into a hospital, may therefore be of interest, at least to those members of the Corps who have been privileged to work there.

The Citadel fortress dominates the whole of Cairo, and contains within its walls three mosques, three hospitals, and barrack accommodation for about two thousand men. It was founded in 1179 by Saladin, and built with stones taken from the smaller pyramids at Gizeh. Since then it has undergone many changes and stood several sieges, of which the most noteworthy perhaps were those by Napoleon Bonaparte in 1799, and by Mohammed Ali in 1805.

Mohammed Ali caused four hundred of the Mamelukes, his former allies, to be treacherously massacred there in 1811. He afterwards built the palace and famous alabaster mosque that bears his name.

The palace, which is now the hospital, consists of a centre block and two large wings. There are two floors, connected by alabaster staircases, and the whole was at one time paved almost throughout with marble. The walls and ceilings were covered with paintings and frescoes by Greek artists, much of whose work is now gradually disappearing. The gilded mirrors and enormous chandeliers have long since gone, but are only just being replaced by electric light.

The three parts of the building are similar in form, and the whole is now used as a hospital. On the upper floor of the centre block is a spacious hall, with two transepts and a central aisle. Its lofty ceiling is still covered with painted carvings, but the enormous slabs of white marble with which it was paved have long since gone. This hall was reached by an alabaster staircase from the main entrance, and now, with two smaller chambers that open into it, is utilized as a surgical ward.

In other adjacent chambers are installed the dispensary, X-ray department, and the hospital reading room and library. Beneath this the centre base is similar in plan to that of the main hall. One of the small rooms here was formerly a bath, but the oval opening in the marble floor has been boarded over to fit it for use as a ward.

In the right wing, now the medical block, the same cruciform arrangement is found, with smaller rooms filling in the spaces between the arms of the cross. Two of these are now wards, and the others have been fitted up for ophthalmic work, and as lavatories and latrines.

From the balcony of the right division, which is now used for tubercular patients, one of the finest views over Cairo can be obtained. Between the centre and right wing is the operating theatre, the walls of which have long since been painted white, but the ceiling still retains its ancient decoration; also other small chambers, one used as an ophthalmic ward, and others for lectures and recreation.

Beyond the Central Hall are the quarters of the nursing staff, which

connect the left wing to the rest of the building. This wing also is cruciform and lavishly decorated, the paintings in some of the smaller rooms being particularly fine.

One of the side rooms in the base is set apart for patients suffering from diseases of the skin, another is fitted up as a mental ward, and a third as a hospital chapel. This last is one of the gems of the Palace, and was formerly the principal bath for the ladies of the Sultan's harem.



The walls and ceiling are covered with frescoes and ornamentation, the floor is of white marble with a square basin, now boarded over, whilst behind the altar can still be seen the fountain basins over which the water formerly splashed down into the marbled bath beyond.

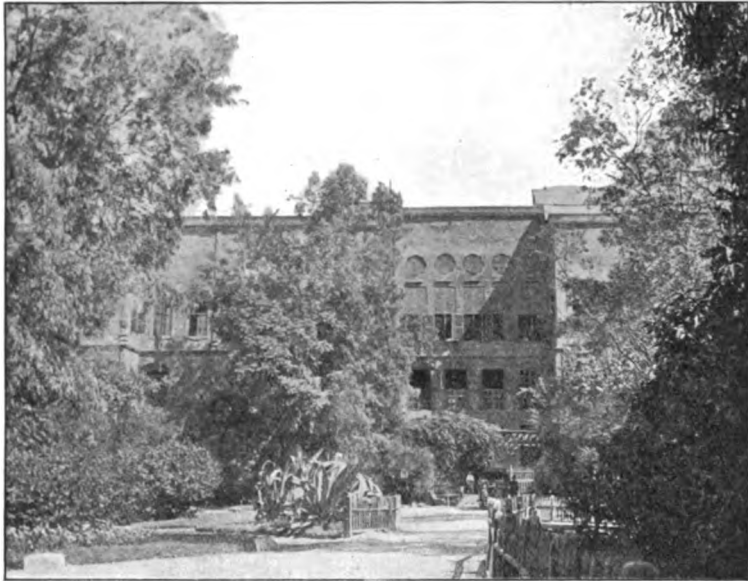
Connected by a bridge to this left wing is a modern isolation block, and in other parts of the Palace are found the various offices, stores, lavatories, mess rooms and quarters necessary for carrying on the work of a great hospital.

In front of the centre and left divisions are the remains of shady gardens, and from the windows and balconies extend fine views over the countless minarets of Cairo, the tomb mosques of the Khalifs and Mamelukes outside the walls, the Nile with its green belt of cultivation between

yellow deserts on either side, and in the distance the great Pyramids of Gizeh towards the setting sun.

Such briefly is the Hospital of to-day, with its 500 beds, and a dozen marquees pitched in a courtyard below, capable of accommodating nearly another hundred patients.

The photographs give a dim idea of its general appearance and of the mural decorations, which year by year become more and more hidden by fresh green paint, and are now being still further marred by the wiring



for electric light. What its appearance was as a Royal Palace in the height of his glory can only be imagined. Probably few beyond the Sultan's ladies and members of his household were privileged to see it.

Afterwards the place fell upon evil days, and at the British occupation in 1882 had been long disused save as an Army storehouse and sundry offices.

The story of its conversion into the fine Military Hospital that we know to-day may for the most part be found in the appendix to the Report of the Army Medical Department for 1881.

After the battle of Tel-el-Kebir on September 13, 1882, and the surrender next day of Arabi and Toulbi Pashas to General Drury-Lowe at Abbasiyeh, Deputy Surgeon-General Sir J. A. Hanbury went to Cairo, and on September 18 "drove round the city with an Egyptian official for the purpose of selecting a suitable building or buildings for hospitals." Eventually "the large structure in the Citadel, called the Mehemet Ali Palace, was chosen as the most suitable."

"Prior to the occupation of British troops it had not been used for any purpose for three years, and before this period had been for twelve years the Egyptian War Office. The whole interior of the building was elaborately painted and decorated, and in many of the rooms there were enormous chandeliers and gilded mirrors.

"When the building was first occupied only the upper story was used, which was capable of accommodating, without crowding, three hundred patients; the lower story was filled with an enormous accumulation of Egyptian stores, records, and rubbish of all sorts. The building itself and all its surroundings were indescribably filthy, and in every part of it there were heaps of refuse.

"The floors were covered with old carpets and matting, a mass of dirt and dust. The building having been covered with excrement, had to be washed three or four times in succession, and the grounds in the vicinity thoroughly cleaned; a very great labour."

"In addition to the ordinary Egyptian latrines, which are in themselves most objectionable, every recess seemed to have been used as a latrine, and on the floors there was a layer of dust, the accumulation of years.

"Day by day the scrubbing, washing, and disinfection of the rooms and passages was carried on; but no remedy save free exposure to the air was successful in removing the heavy faecal smell which at first prevailed throughout. This was at last got rid of by the plentiful use of soap, disinfectants, and above all, by free exposure to the air, when the building presented a very respectable appearance, and for hospital purposes afforded as good accommodation perhaps as any other in the City."

Entirely new latrine accommodation had to be provided, and improved ventilation throughout. The water supply from the Egyptian waterworks was good, but the wells in the Citadel had to be closed as they were found to be contaminated.

The cooking arrangements "were carried out in an enclosed verandah in the garden at the entrance to the hospital," where the kitchens may still be seen to-day. For drainage there were only surface channels all round the building, and considerable alteration and improvement were required.

However, all was done in time, and Brigade-Surgeon Barnett was able to report that "notwithstanding all that has been said to the contrary, it may safely be affirmed that the Citadel Hospital answered admirably the purpose to which it was appropriated."

That statement remains true to this day. In spite of some inconveniences that are to be expected in every building diverted from its original purpose, and in spite of its position at some distance from the principal barracks and centres of administration, the Citadel Hospital, with its high situation, spacious rooms and ample cross-ventilation, is to-day not only one of the finest, but probably the most interesting of all the military hospitals in the Empire.

Echoes from the Past.

SOME ECHOES OF THE PAST.

BY LIEUTENANT-COLONEL W. A. MORRIS.

Royal Army Medical Corps (Retired Pay).

THIS record of the military services of medical officers in India who lost their lives in the N.-W. P. and Oudh Provinces (now U.P. and Oudh) from 1788 to 1860, is full of transcendent interest. Of thirty-seven names recorded, no less than fifteen were killed, and the majority, with many others, under circumstances of peculiar brutality. It has not been a very easy task to find out all these names, and I shall be glad to hear of any I may unintentionally have missed. The labour has been a pleasure, and a duty to my brother officers of so long ago, and I wish the description of these brave and splendid services could have been written by a more capable pen than mine. Many a lesson can be learned from their lives in these times of increasing luxury and diminished danger.

DR. THOMAS HAMILTON.—By the *kacheri* office of the Collector of Farrakabad lies the tomb of this medical officer, who must have been an officer of considerable rank in the Honourable East India Company's service. The tomb is very large and substantial, and bears the following inscription :—

*Sacred to the memory of THOMAS HAMILTON, Esquire,
Head Surgeon, who died 12th August, A.D. 1788, aged
60 years. This monument was erected by Major A.
Farmer, Executor.*

Farrakabad was, and now is, a large flourishing city in the Agra Division near the Cantonment of Fatehgarh, and came into the possession of the English about 1774, when they supported the Rohilla-Nawab, and defeated the Rohillas conquering Rohilkund. In 1801 the whole was ceded to the Honourable East India Company, and with one more successful battle Lord Lake drove Holkar with the rebel Rohillas away and utterly routed them. It has since belonged to the British. This account would seem to place Dr. Hamilton as a P.M.O. or an S.M.O. with the John Company's Troops.

ASSISTANT-SURGEON I. WILKINS.—In the old cemetery at Chunar is still preserved the tomb of Assistant-Surgeon I. Wilkins, with the following inscription :—

*A tribute of friendship to the memory of I. WILKINS,
Assistant-Surgeon, who departed this life on the 21th
March, A.D. 1792, aged 37 years.*

Chunar forms one of the landmarks of Indian history. In 1530 it was the residence of Shere Khan, the Afghan, and forty-five years later was besieged after an investment of six months, and taken by Akbar. In 1763 it fell into the hands of the English under General Carnac, and a few years later was visited by Warren Hastings, who was so pleased with the position and appearance of this place that he wished to make it his principal residence.

Dr. Wilkins might be justly placed as one of earliest civil surgeons of India, or a medical officer who, still retaining his rank in the Army, performed duties among the native population, and largely contributed by his personal skill and operative powers to the progress of civilization.

SURGEON JAMES HENRY LAW.—All that can be acquired with regard to this officer is the simple inscription over his grave, in the cemetery by the *kacheri* at Cawnpore.

*JAMES HENRY LAW, Surgeon, H.M. 27th Light
Dragoons, who died June 12th, 1801, aged 26 years.*

ASSISTANT-SURGEON HOOPER.—In the Kunch cemetery, Jalaun District, there is a memorial pillar erected to those officers and men of 18th Regiment who fell fighting against the Pindari outlaws. The inscription includes Assistant-Surgeon Hooper, 1st Battalion, 18th Regiment, with "other brave men" who fell in action with Mir Khan, Pindari, near Kunch, May 22, 1804.

The Pindarees were freebooters, whose ravages were allowed through the supineness of the British Government to be the scourge of Central India and the Deccan from 1804 to 1814. These banditti, who had their homes in Central India under the protection of Scindhia and Holkar, inherited the customs and traditions of the early Mahrattas under Sivaji. Mounted on hardy ponies they used to sweep through the land in large bands, harrying the defenceless husbandmen at the spear's point and carrying back stores of booty to their distant camps. Their audacity was so great that they paid no regard to the armies of the native powers, and were scarcely to be deterred by the presence of the British force.

SURGEON WILLIAMS lies in the cemetery near the *kacheri* at Cawnpore, and on his tomb is inscribed :—

*Surgeon WILLIAMS of Artillery who died 20th June,
1808, aged 65 years.*

Surgeon Williams belonged to the East India Company's Artillery, and the remarkable feature is the age of this officer.

ADAM MITCHELL.—Is buried in the Cemetery near the fort at Chunar. The inscription on his tomb runs :—

*Sacred to the memory of ADAM MITCHELL, Esquire,
Surgeon, who died at Chunar, January 23rd, 1809.*

MRS. ELIZA EVANS.—At Cawnpore, wife of Mr. Evans, Civil Surgeon of the Station, who died November 18, 1810.

SURGEON HENRY O'HARA.—At Cawnpore, Surgeon Henry O'Hara, 19th Regiment, who died December 23, 1816.

ASSISTANT-SURGEON A. SHANNON.—At Cawnpore, A. Shannon, Esq., Assistant-Surgeon H.M. 14th Foot, who died June 19, 1817.

SURGEON GEORGE REDDIE.—In the Cemetery at Cawnpore.

*GEORGE REDDIE, Superintending Surgeon, who died
September 22nd, 1827, aged 58 years.*

SURGEON J. HECTOR MACKENZIE.—Cemetery at Kaitha in Tehsil Rath.

*Sacred to the memory of JAMES HECTOR MACKENZIE,
Surgeon to the 3rd Native Cavalry H.C.S., who departed
this life 23rd May, 1828, aged 40 years and 5 months, in
the full hope of the promise made to all who believe in
our Saviour Jesus Christ. He was a dutiful son, an affec-
tionate husband, and brother. This small tribute is erected
by his disconsolate widow.*

SURGEON J. O'MALLEY.—At Cawnpore, James O'Malley, Esq., Surgeon, 11th Dragoons, who died July 27, 1820, aged 42.

ASSISTANT-SURGEON J. THOMSON. — At Cawnpore, James Thomson, Esq., Assistant-Surgeon, H.M. 38th Regiment, who died June 6, 1828.

SURGEON PATRICK MATHEW.—Cemetery near *kacheri*, Cawnpore, Patrick Mathew, Esq., Staff Surgeon, who died August 15, 1830, aged 45.

SURGEON THOMAS C. HUNTER.—Mirpur Cemetery, Cawnpore.—Thomas C. Hunter, Surgeon, Bengal Army, aged 44, and died March 25, 1838.

SURGEON WILLIAM McL. ROSE.—Cemetery near *kacheri*, Cawnpore. William McL. Rose, Surgeon, 11th N.I., who died September 25, 1843.

SURGEON A. MCQUEEN.—At Gwalior. Included on a monument: "To the Memory of the Officers, H.M. 3rd or Buffs Regiment," is the name of this officer.

Surgeon ALEXANDER MCQUEEN, M.D., died in Camp at Gwalior on 24th January, 1844, aged 50 years.

ASSISTANT-SURGEON W. SCOTT.—Kydgunj Cemetery, Allahabad.

Sacred to the Memory of WALTER SCOTT, Esquire, Assistant-Surgeon E. I. Companys' Service, second son of Walter Scott, Esquire, of Wauchpol, Roxburghshire, who died at Allahabad 17th August, 1844, aged 27 years.

SURGEON W. HARVEY.—Cemetery near *kacheri*, Cawnpore. William Harvey, Esq., Surgeon, 70th Regiment, who died August 18, 1851, aged 23.

DR. HEATHCOTE.—This officer, with his wife and two children, were killed at or near Fatehgarh by the rebels, on July 10, 1858, and their names are inscribed, with many others, on a cross erected as a memorial over the well in the Fatehgarh Churchyard, and into which many bodies were thrown. The exact work Dr. Heathcote performed I cannot discover, but I feel sure he was in the Company's employ.

The story of Fatehgarh is a short but sad one. At the time of the Mutiny and to a few years ago, it was a gun-carriage factory. Three weeks before actual hostilities commenced, the garrison heard of the revolt in Bareilly and Shahjehanpur, distant about 80 miles.

The news of the outbreak at Cawnpore had not reached Fatehgarh, when as the result of a council under Colonel Smith it was decided to despatch the women and children to Cawnpore, which was the nearest garrison. On June 4, 170 non-combatants started in boats, of whom 126 went to Cawnpore and were murdered by the Nana, and the remainder returned to Fatehgarh, as they had heard rumours of the events taking place at Cawnpore.

From June 25 to some date in July the Fort, in which the factory was placed, was the scene of a desperate resistance, till finally the whole garrison, having spiked the guns, evacuated the place in three boats. All—with the exception of Mr. Gavin Jones, who practically was so wounded and in such pain that he could be of no use, and so took his chance in a native village—were

murdered. Mr. Jones escaped, and I saw him a year ago at the age of 75 looking fit and well. Before he was wounded and in the siege, this gentleman performed heroic service. Dr. Heathcote and his family must have been murdered on one of these fatal journeys.

ASSISTANT-SURGEON S. MOORE, 6th Dragoon Guards, died at Meerut, on June 2, 1857. His tomb lies near the west gate of the Meerut Cemetery, and bears the following inscription :—

*Sacred to the memory of STEWART MOORE, Esquire,
Assistant-Surgeon, H.M. 6th Dragoon Guards (Carbineers),
who died at Meerut, on the 2nd June, 1857, of wounds
received in action with mutineers at Ghazi-ud-din Nagar,
on 31st May, 1857, aged 26 years.*

This tomb was erected by his brother officers as a token of their sincere regard.

SURGEON H. H. DOWLING, 56th N.I.

This officer was killed at Shahjehanpur, and his name appears on the monument to those who suffered with him.

I.H.S.

*This monument is erected by the friends and relatives
of these honored and beloved ones whose names are here
inscribed, who yielded up their lives unto death, through
the violence of a lawless and fanatical insurrection at this
station on the 31st May, A.D. 1857.*

*To the care of two poor natives, residents of this city,
they owe a grave on this spot, and in God their Saviour
we hope they have found a place.*

ASSISTANT-SURGEON R. NELSON, 90th Light Infantry, died at Lucknow of fever on August 18, 1857, during the siege, and his name appears on a monument erected by the officers of H.M. 90th Light Infantry in memory of their comrades who fell during the Indian Rebellion of 1857 and 1858.

ASSISTANT-SURGEON D. MCAULEY, M.D., Royal Artillery, was killed on June 30, 1857, in Wheeler's entrenchment at Cawnpore. He was in medical charge of the picquet at the barracks on the eastern aspect of the entrenchment. His name appears on Tablet No. 2 in the Memorial Church. His hospital steward W. Heffernan, and his assistant apothecary W. Slane lost their lives, the former being killed and the latter dying of disease. Both names are included on this tablet, with Assistant Apothecary J. Thomson and

Hospital Apprentice W. A. Conor and his wife, who were killed in the entrenchment.

SURGEON W. R. BOYES, 2nd Light Cavalry.

This officer with his wife survived the terrible experiences of the besieged entrenchment and the massacre at the Suttee Chaura ghat. They escaped in a boat, but were caught at Shiurajpore and brought back prisoners to that infamous fiend the Nana of Bithoor, and their names appear on No. 3 Tablet in the Memorial Church. Three days later they were shot with the survivors of sixty men, twenty-five ladies, and four children. I extract the following from an old book issued by the Catholic Orphan Press and called "The Key to the Tablets in the Memorial Church."

Having escaped from the ghat, "the boat was carried by the current to Najafgarh. At sunset they were overtaken by a pursuing boat with sixty men, and grounded on the same sand bank. Exhausted, famished, sick and wounded as they were, they attacked their pursuers, very few of whom returned to tell the story. On the 29th the boat having drifted in a creek, the enemy poured a shower of musket balls upon the miserable inmates. Then Vibart,¹ who lay helpless with both his arms shot through, issued his last orders. The forlorn hope under Mowbray Thomson and Delafosse, eighteen men of H.M. 32nd Regt. and 84th landed and attacked their assailants. The fierce energy of desperation drove them forward. Sepoys and villagers surged round those whom they attacked. On their return they found the boat had gone, and after one more stand in a temple but four survived, and were sheltered by Drigbejay Singh, the loyal Taluqdar of Morarmow." The remainder in the boat were caught later, and were ordered to be shot. This sad story is completed with the following incident: "Captain Seppings though shot through the arm sued for a few minutes' respite to pray. This was allowed, and they all knelt down and prayed the last prayer their mortal lips would utter. A volley of musketry now opened upon them, killing a few, and wounding many, who were then slain with the sword." Mrs. Seppings and probably all the ladies who survived with their children were taken to the slaughter house and killed on July 15; but Mrs. Boyes refused to be separated from her husband and was killed with him.

¹ Major R. Vibart, 2nd Light Cavalry, not Captain E. C. Vibart, who was killed with the Fatehgarh fugitives at Cawnpore, on June 10, 1857.

SURGEON N. W. K. NEWENHAM.—This medical officer was surgeon to the 1st Native Infantry, and was killed during the siege with his wife and children, and their names are inscribed on No. 3 Tablet in the Memorial Church.

SURGEON N. COLLYER.—Surgeon Collyer belonged to the 53rd Native Infantry and died of wounds during the siege.

ASSISTANT-SURGEON I. P. BOWLING.—Surgeon Bowling was medical officer of the 63rd Native Infantry and was killed during the siege. His wife and children were murdered at the ghat.—Their names appear on No. 5 Tablet in the Memorial Church.

SURGEON C. GARBETT (Tablet No. 5).—This officer was the superintending surgeon of the siege and died from fever in the entrenchment. He was S.M.O.

ASSISTANT-SURGEON H. P. HARRIS (Tablet No. 5).—This officer was civil surgeon of station. He escaped slaughter at the ghat, but was caught on the 28th and murdered on the 30th. His wife and child were killed at the ghat.

ASSISTANT - SURGEON R. D. D. ALLAN (Tablet No. 5).—This officer was in military employ, and had served at Moodki, Ferozshah, and Aliwal in the Punjab Campaign, but I cannot trace his regiment. He was killed with his wife during the siege.

MRS. DARBY.—This lady was the wife of Surgeon Darby of H.M. 32nd Regiment, who was left at Cawnpore when her husband was ordered to Lucknow where he was killed. A child was born to her in the entrenchment, but she only survived this to be murdered with her child at the ghat on June 27, 1857.

ASSISTANT-SURGEON S. MALTBY.—This officer was Civil Surgeon at Fatehgarh, and with his wife was among those who escaped from that station only to be killed on July 15, at Cawnpore by the Nana. Their names appear among the list of Fatehgarh fugitives on Tablet No. 13, Memorial Church.

DR. AND MRS. MCEGAN were murdered at Jhansi, but I am unable to trace his connection with the service. He may have been in civil employment, or a medical missionary. These martyrs' names are included in a list on a monument erected by Government and placed in the Memorial Garden at Jhansi to the memory of sixty-six persons murdered during the mutiny at the place.

DR. STACK.—On the Lalitpur road, near Jhansi, there is a monument erected to this officer. The inscription runs as follows :—

*Sacred to the memory of Dr. STACK, Her Majesty's
86th Regiment, who was shot at the storming of Jhansi
on the 3rd April, whilst attending on a wounded soldier.
Aged 39 years.*

*Erected by his brother officers in testimony of their
esteem.*

W. E. LYNCH.—Assistant-Surgeon W. E. Lynch, 7th Hussars, died at Lucknow, January 24, 1859.

“QUÆ CECIDERE, RESURGUNT.”

Review.

A TEXT-BOOK OF MEDICAL ENTOMOLOGY. By W. S. Patton, M.B., I.M.S., and F. W. Cragg, M.D., I.M.S. London, Madras, and Calcutta: Christian Literature Society for India. 1913. Pp. xxxiii and 764.

The ordinary medical man who wishes to take up the study of those diseases in the transmission of which insects play a part meets with an almost overwhelming obstacle in the fact that entomology is a subject of very great dimensions, and that its literature is scattered throughout many publications in many languages. Even when a well equipped library is at his disposal, he is faced with the problem that in order to fully understand the work of many observers he must, at the outset, study general entomology and familiarize himself with the very technical phraseology used before he can even begin the study of the particular subject he may wish to investigate. Furthermore, on commencing experimental research, he is beset with difficulties owing to the lack of detailed information on the necessary laboratory technique. The authors have endeavoured to make this preliminary task an easy one by presenting, in the form of a volume of moderate size, a work dealing with entomology in its medical aspects, which may serve as a guide to the study of the relation between arthropods and disease.

We congratulate the writers on the success with which they have attained their object. As the Director-General, I.M.S., in a “foreword” says, they have covered an immense and in many places untrodden field, and have still kept their book thoroughly practical. In arranging the matter, they have observed, as far as possible, a regular sequence, the general features of the group, its relation to disease and its natural parasites, external anatomy, classification and description of species, bionomics, and breeding habits, methods of breeding and manipulation in the laboratory, internal anatomy and methods of dissection being

discussed in turn, concluding with a list of references to the published papers dealing with the group. One chapter (on the anatomy of the Diptera) is intended to serve as an introduction to insect morphology, and deals at length with certain matters which therefore need only a brief reference in the description of other groups.

As in the past many important advances in knowledge have depended on the study of non-pathogenic organisms, the authors have included accounts of many blood-sucking arthropods which have, so far as we know at present, no connexion with disease.

A most valuable feature is the inclusion of keys to the genera and species, which have been compiled by various specialists, and which should prove of the greatest service in the identification of specimens, especially to the isolated worker who has no type collection for reference.

In accordance with the main object of the book, particular attention has been paid to the description of methods of breeding and laboratory manipulation of the different groups, and a special chapter deals with histological and general laboratory technique.

As is necessary in a work of this kind a considerable amount of the matter has been compiled, but there is also a large amount of original work both in the text and in the figures.

The book is clearly written and very fully illustrated with photographs and excellently reproduced drawings, and we have no hesitation in recommending it not only to those who, by reason of opportunities of time and place, contemplate original research, but also to those who wish to follow in an intelligent manner one of the most important branches of modern medical investigation.

C. J. C.

Current Literature.

Plague Investigations in India (Ninth Report, *Journ. of Hygiene Plague Supplement IV*).—Extensive observations have been carried out by Kunhardt and Taylor, assisted by R. G. Izer, T. K. Menon, B. V. Varadachari, R. Ragharendra Rao, and K. Narazan Rao, as to the conditions of climate and physical geography in relation to the incidence of plague in a number of districts of the Madras Presidency. Their conclusions are summarized as follows:—

(1) From 1898 to 1910 ninety per cent. of the plague deaths in the Madras Presidency have occurred in certain districts which immediately adjoin infected areas in the Bombay Presidency and Mysore State. The Bellary and Nilgiri districts as well as the Hosur taluk in Salem district, and the Kollegal taluk in the Coimbatore district, have been most severely and persistently infected.

(2) In certain years, especially when the temperature has been lower, and the humidity higher than normal, plague has extended to places immediately adjacent to the infected areas of the Madras Presidency mentioned above, and serious epidemics of plague have developed especially in certain large municipal towns, while the disease in the surrounding villages has generally been mild.

(3) Although plague has invaded the Madras Presidency, it has shown little tendency to flourish in places beyond the limits indicated above. These limits had been attained by the year 1903. Such districts as have been affected for the first time since 1904 have returned comparatively few deaths from this disease.

(4) While the districts which have suffered most from plague have the characteristic in common that they are in the closest proximity to infected areas outside the Presidency, they also resemble each other in being the most elevated and coolest parts of the Presidency.

(5) A low-lying, comparatively hot, and dry plain, separates the areas at present infected from the more humid and cooler coastal regions, especially in the north of the Presidency. Plague has rarely occurred on the east coast, but on the west coast the seaport towns of Mangalore and Calicut, which have intimate trade relations with Bombay, have suffered from the disease.

(6) In seeking for an explanation of the limited distribution of plague in the Madras Presidency, it is difficult to evaluate the influence of the various factors which favour or prevent the spread of infection. For any given place, a number of circumstances, some more, others less favourable to the development of the disease, are at work together. Thus, while the severely infected areas of the Madras Presidency are situated in close proximity to similarly infected areas in charge of other administrations, being for this reason more open to infection, these same areas enjoy a climate which approximates to that which, from a study of plague in other parts of India, we have come to regard as favourable to plague. It appears that the proximity to infected areas, and the facilities for communication with them, seem to have been more important than its climate in determining the plague incidence in the Bellary district. This is supported by the fact that the Kurnool district, with a very similar climate, but more distant from infected centres, and with less rapid and efficient means of communication, has suffered but little from plague. On the other hand, plague has been severe in the Nilgiris, where the population is scattered and the means of communication are indifferent, but where the climate is very favourable for the diffusion of the disease.

(7) An examination of rats and fleas found in places selected in (a) the severely infected area, (b) the moderately infected area, and (c) in the plague-free areas of the Presidency, has shown that in none of them, in the light of the Commission's experience elsewhere, was the number of rats and fleas too small to prohibit the development of an epidemic in them.

(8) Experiments have shown that rats caught in places in Madras which have been free from plague epidemics are very susceptible to plague infection. This indicates that conditions exist in those places which have hindered the successful implanting of infection in them. The authors attribute this comparative immunity to the warm climate obtaining over the greater part of the Presidency.

(9) As plague is carried from place to place in the bodies of infected fleas, and as, even when infected rats are transported from place to place, there is nevertheless an interval when infected fleas are separated from their host before finding access to man, any local conditions affecting the survival of these insects apart from a host are of importance. Separated

from their host, rat fleas speedily succumb to the combined effects of high temperature and drying. Unfavourable conditions of this kind are found in the hot and dry plains which separate the cooler and moister sea-coast districts from the existing areas of infection in the Madras Presidency. Accordingly this area breaks the chain of communication between the infected area in the west and the cooler regions of the east coast. At the same time facilities for the importation of infected rats to the coastal districts by way of the sea are poor, for no very satisfactory harbour exists on the east coast of the Madras Presidency, where ships can discharge cargoes directly upon the wharves.

(10) The authors conclude that the physical features and climate of the Madras Presidency have an important influence in limiting the distribution of plague in it.

S. Rowland concludes, as the result of further experience, that as the conditions in the culture medium used for the propagation of the organisms which are to afford an antigen approach those which obtain in the body of the living animal, so the efficiency of the antigen against a body strain of plague is increased. In these experiments organisms from the spleen of a rat dead of plague were used, but in a later series of experiments in which the standard virulent laboratory culture, which has recently suddenly risen in virulence, was used, immunization almost completely failed. Attempts to immunize rats and guinea-pigs against serum-grown *Bacillus pestis* by means of the pseudo-tubercle bacillus failed, though guinea-pigs have been so immunized against broth-grown strains. Vaccination with living avirulent plague organisms (Strong) grown on agar produced a small but distinct immunity in guinea-pigs, but in rats the degree of protection was less than that obtained with the original virulent strain. The rats immunized with the living avirulent strain showed a lower degree of immunity against a culture isolated by Castellani from a case of plague in Ceylon, than when tested with the standard laboratory strain, though the latter was the more virulent. From this he infers that the antigens from these two latter sources are not entirely identical.

In a previous report Rowland showed that a protective and curative serum for rats can be prepared against a broth-grown strain of plague by immunizing horses against a nucleoprotein extract of the same strain. This serum, tried in practice in cases of human pest, proved valueless. He now describes the immunization of a horse with graduated doses of toxic nucleoprotein extract from a body-strain of plague grown in horse serum. This provided a serum of marked protection and curative power when tested on rats against a serum-grown strain.

As the preparation of a nucleoprotein extract of plague bacilli is a somewhat difficult operation, Rowland sought a means of preparing a whole vaccine in which the infectivity could be destroyed without the use of heat or other agency deleterious to the antigen. With this object he carried out experiments on the effects of ultra-violet light. He found that plague bacilli could be killed by five minutes exposure to the ultra-violet light of a carbon arc, but that the killing of the organisms was accompanied by destruction of the antigen. Further researches showed that the region of the spectrum which is responsible for the bactericidal effect is precisely that region which destroys the antigen.

A. W. Bacot reports observations on the length of time that fleas

(*Ceratophyllus fasciatus*) carrying *B. pestis* in the alimentary tract are able to survive in the absence of a host, and retain the power to infect. Fleas were infected by feeding on moribund mice, and subsequently healthy mice were introduced into the flea cages. He finds that these fleas are able to carry *B. pestis* for periods up to forty-seven days in the absence of a host and subsequently to infect a mouse. Also that infected fleas starved for forty-seven days and then placed on a mouse, may not infect it for a further period of about twenty days. There is no reason to suppose that these results represent the limit of time after which infection may take place.

In "Further Notes on the Mechanism of the Transmission of Plague by Fleas," he states that an examination of longitudinal serial sections of infected fleas confirms the conclusions already arrived at, and also shows that in some cases, after complete blocking of the proventricular valve, the obstructing mass becomes ruptured, leaving a passage through which blood may flow in either direction and thus, if anything, increasing the infectivity of the flea.

He also studied the development of the plague bacillus in bugs (*Cimex lectularius*) and their power to convey infection. Bugs were fed on infected mice, and subsequently smears of stomach contents and sections of the bugs were examined microscopically, and the infected bugs were allowed to feed on mice. He finds that (1) for a percentage of bugs, and probably for all newly hatched ones, a meal of septicæmic blood from a mouse dying of plague is fatal; (2) bugs which are not killed by the infecting meal carry *B. pestis*, and can reinfect mice after a period of forty-eight days starvation; (3) the development of *B. pestis* within the crop of bugs differs from that which takes place in the stomach of the flea in respect of its slower and looser growth, this limitation of activity being accompanied by, and possibly due to, the preservation of structural character of the blood for many days after ingestion; (4) the absence of a valve between the pump and the crop, together with the looser nature of the growth within the bug preclude the idea of mechanical blockage and regurgitation as occurs in fleas, but infection may be caused by interruption during feeding followed by a second attempt.

C. J. C.

Standardization of Bacterial Suspensions by Opacity (H. C. Brown and E. W. O'G. Kirwan, *Indian Journal of Medical Research*, January, 1915).—As a standard of opacity the writers use a series of dilutions of a one per cent suspension of freshly precipitated barium sulphate in one per cent sodium citrate. A tube about four millimetres internal diameter containing the bacterial emulsion is compared with similar tubes of the standard suspension in a good light against a clearly printed book. They find that a ten per cent variation in the dilution of the barium sulphate suspension can easily be recognized, and hence expect a similar degree of accuracy in estimation of bacterial counts. To establish their data a careful determination of the number of *Staphylococcus aureus* contained in one milligramme of the dried organism was made, and the dilution of the standard suspension corresponding with an emulsion of the same weight of bacteria in one cubic centimetre of saline fixed. Other organisms were counted against *S. aureus* according to the method suggested by Braxton Hicks, and a table compiled showing the

number of bacteria in one cubic centimetre corresponding in opacity to a series of dilutions from one in eight to one in sixteen of the barium sulphate suspension. They draw attention to the fact that in every case a culture incubated at 37° C. for exactly twenty-four hours was used, for the opacity of a bacterial suspension is dependent upon the age of growth of the contained organisms.

C. J. C.

Agglutinins in the Blood of Cholera Cases.—Major E. D. W. Greig (*Indian Journal of Medical Research*, January, 1915) has examined the blood of three hundred and sixty-three cases of cholera. In sixty-four fatal cases the majority showed an absence of specific agglutinins, although some lived for seven days. In the non-fatal cases, however, of which two hundred and ten were examined, agglutinins were well marked by the sixth day, and often reached a high titre (one in four hundred to one in one thousand). A maximum is attained about the seventeenth day, and a drop appears to occur about the twentieth day. Agglutinins were also present in the blood of carriers. Accordingly the test, while of no diagnostic value in acute cases, may be exceedingly useful in the investigation of convalescents or suspected carriers. In the eighteen cases in which the true cholera vibrio as well as a cholera-like vibrio were found by cultural methods agglutinins were developed for the cholera vibrio only. Agglutinins were also found in a few cases out of a number in which the true cholera vibrio was not demonstrated by culture; a fact which suggests that cholera vibrios may have been present. In no case did vibrios other than cholera agglutinate with the sera of the patients from whose stools they had been isolated.

C. J. C.

X-ray Wagons in the Field.—In the *Presse Médicale*, December 17, 1913, Médecin-Major Busquet, staff officer at the Ecole d'application, Val de Grâce, Paris, publishes an interesting article on Radiology in various armies during war ("De la Radiologie dans les Armées en Campagne").

In 1904 a motor wagon was brought out by Gaiffe and Panhard Levassor and tried on manœuvres in France. Examination of the patients was carried out inside the wagon. The next motor was designed by Dr. Lesage.

A portable X-ray outfit was tried in certain field hospitals in Morocco.

The German Army about 1908 introduced a horse-drawn X-ray wagon. The X-ray work here appears to be carried out by placing the patient for examination on a stretcher supported on two chairs; and two other chairs on either side of the patient are used for suspending the apparatus.

The writer then refers to an Italian field apparatus described in the *Military Surgeon*. These models, he holds, are able to do a certain amount of work, but do not quite comply with ideal conditions for work in the field.

Three questions require to be considered:—

- (1) The necessity and utility of the apparatus.
- (2) The kind of apparatus and its special qualities.
- (3) The conditions under which it will be used.

(1) The necessity for such an apparatus was proved up to the hilt in the late Balkan War. Major Metzger, U.S.A., in an article in the

Military Surgeon, holds that an X-ray outfit is indispensable to every group of field medical units.

(2) The apparatus should be capable of being moved about and be ready for use anywhere at any time. It must be able to generate its own electricity and have sufficient potentiality to take pictures with an exposure of a few seconds. This is necessary because of the large number of wounded who will require examination about the same time and in whom immediate operative interference will be indicated.

It must be strong enough to stand frequent removals and be simple enough to be used by people who are not really experts. The question of an examination and radiographic chamber must also be considered.

The simplest way is to have a tent pitched along the side of the wagon which, if necessary, can be heated. In this way the operator has fixed ground to work on, and his pictures will not be affected by the vibrations of the dynamo.

(3) With regard to the question of where the apparatus can be most usefully employed, it is generally admitted that they can only be satisfactorily used in field hospitals, and it is here that they are employed in the German and Italian armies.

If one studies a map on which the different phases of a battle have been marked, one is struck by the large amount of ground that is covered, and with the large task that will devolve on the medical service in the collection and treatment of the wounded. The writer then quotes from a lecture by Méd. Inspecteur Mignon: "Imagine for a moment the extent and the aspect of a modern battlefield. It may be forty kilometres long, and fifteen to twenty kilometres in depth. Field ambulances, sections d'hospitalisation, tents, houses, farms and villages represent on it the wards of a great hospital."

It is in these various places that the wounded will be collected, to save them the pain of removal by lengthy evacuations. "Men wounded in joints or viscera will remain where they are until it is certain that no complications will result from a hasty and lengthy removal." The teaching then of modern wars is that there will be large numbers of wounded who cannot be evacuated and that medical and surgical aid must be sent up to them. It is here where an X-ray motor wagon will come in useful. The writer holds that it must be a motor wagon and that it should be attached to one of the medical units in the Army Corps and march in the first or second line transport; at any rate be handy at short notice. After an engagement it could perform a daily tour of the immobilized ambulances to assist in making diagnoses where required.

Messrs. Massiot et Radiguet have constructed an automobile to Méd.-Major Busquet's design which fulfils all these requirements. It carries three attendants, and on the roof of the car a tent is carried which can be pitched alongside in a few minutes. The illustrations in the article indicate that everything has been carefully thought out.



Correspondence.

TO THE EDITOR OF "THE JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

ASPHYXIATING GASES.

SIR,—On April 23, 1915, the French and British positions were attacked by the enemy and asphyxiating gases were used by them.

These gases appear to be of two kinds—(1) a heavy gas which is of a yellow-brownish colour, which is discharged by means of pipes supplied from cylinders where the gas is contained at high pressure; these pipes are passed out over the parapet of the enemy trench and are attached to the cylinder; any number of lengths of piping can be used. When the wind is favourable the cylinder tap is turned on and the heavy gas is driven towards our trenches, into which it sinks.

The effects of this gas, which is believed to be chlorine, are those of asphyxiation; the men affected show a peculiar discoloration of the skin of the face and hands, they suffer greatly from "air hunger," the breathing is short and the respiratory movement of the thorax is much accentuated; they remain in a semi-conscious condition, which varies according to the severity of the gas poisoning.

Post-mortem examination shows marked damage to the lung tissues, small hæmorrhages and breaking up of the pulmonary alveoli are seen. A viscid secretion is invariably found in the bronchi and bronchioles; this accounts for the severe "air hunger" from which all cases suffer, as the oxygen-absorbing surface of the lungs is so severely impaired. This gas does not appear to affect the red blood cells.

(2) The other poisonous gas is produced by shell explosions; the effects of this are of a different nature and apparently it has not the same asphyxiating power. It causes severe dyspnoea and great irritation of the conjunctivæ and temporary blindness, in some cases vomiting after a paroxysm of coughing. The effects of this shell gas do not appear to be of as lasting a nature as those of the heavier gas.

The above notes have been made from personal observation of the cases affected, and also from information received from German wounded.

I am, etc.,

H.-Q., II Army, B.E.F.,
May 2, 1915.

J. T. McINTIRE,
Major, R.A.M.C.

No. 4.

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Original Communications.

BYPATHS IN EVOLUTION.

BY COLONEL R. H. FIRTH.

As the outcome of their professional education, probably no class of men are more imbued with the spirit and ideas of evolution than doctors ; yet, frequent discussion of the subject leaves one with the impression that very few persons think of evolution except in regard to biological problems. As exhibit of the not exclusively biological aspect of Darwin's great generalization, this article has suggested itself as likely to widen the outlook upon a most fascinating subject. Its theme is the twofold argument that the process of evolution is characterized by an equal and parallel progression of opposites, and that this principle has an intimate bearing upon human purpose and our judgments on human conduct.

An elementary knowledge of biological change brings home the fact that it does not follow always the same direction. The startling progress, which we observe when the lowest forms of life are compared with the highest, has clearly not been obtained by uniform advance along every channel in which the change has run. We find that in countless instances the process has been broken off abruptly by the extinction of species. Where the species has survived the change has been sometimes towards simplification, at others towards an increased complexity. For races which have attained a high degree of differentiation there may be, if we can predict the future from the past, three possible

futures ; either simplification, or destruction, or continued growth in complexity. These are contrasted processes which stand for degeneration and development. If we inquire what are the most favourable conditions for survival, we find that increased complexity or advance in evolution is not one of them ; victims are taken from every grade, and the highest has no immunity. The explanation is, that survival demands a nice adjustment of the whole organism to its surroundings, or first, a sufficient but not excessive plasticity, and secondly that, when an organism either advances or recedes, the development or degeneration should be general and not confined to any one part. This disturbance of the adjustment is as likely to take place in the higher as in the lower ranks of life, and the changes in the environment are usually of a kind which cannot be foreseen. This common liability to extinction is nothing more nor less than a parallel progression of adaptation and misadaptation ; meaning that, so long as a species survives, the dangers to which it is exposed are always counterbalanced, but not unduly, by its capacity for resistance. The gain and loss on either side of the equation are about equal throughout.

We may assume that the end to which the evolutionary process is directed is a perfect organism and a perfect life, constituted by a perfect correspondence of the organism with its environment. At that ultimate end of evolution, the organism would never fail in the efficiency with which it met changes in the environment, and there would be eternal existence and universal knowledge. Any approximation to this desirable end is measurable by the number of separate adaptations which have been accumulated, entailing the view that the best adapted organism is also the most complex, or complexity of organization and fitness to survive are interchangeable terms. This is a pleasant theory, but not supported by the facts of experience. Nowhere in all Nature can we find an instance where the number of adaptations has increased, while the number of misadaptations has decreased, or even remained stationary ; what we find throughout forward evolution is a simultaneous and parallel increase of both. Take the case of our own birth and infancy. The ease with which a savage woman can give birth to a child contrasts markedly with the corresponding physiological process in a woman of a highly civilized or advanced race. The same holds good of the offspring ; at no stage of life is the increased misadaptation of the higher animals to their environment more marked than in infancy, and the full measure of infantile helplessness is reached only in man, a species weighted in the struggle for existence

not only by the imperfect adaptation of its young, but also by the onerous duties which are thereby imposed on the adults. So, again, disease is a misadaptation which lessens the length of life and, be it physical or mental, is found the greatest cause of death only in man. The facts admit, however, of a more general statement, namely, that every fresh modification is attended by new risks and disadvantages to the organism as a whole. This means that no special adaptation can be used as evidence of a higher or lower degree of general adaptation; and the general adaptation of a creature is the balance of all the advantages and disadvantages of all its separate organs, including some which appear to be altogether useless though they are not on that account, necessarily, wholly innocuous. In the higher animals, destruction or even imperfect functioning of an organ commonly impairs or finally arrests the activities of the whole organism. Moreover, the more highly developed an organ is, the greater are both its value and its liability to derangement; as examples, we can instance the eye and the brain of man. From this point of view, forward evolution means the multiplication of parts combined with an increased solidarity between them all.

The conception of evolution as growth, accompanied by increase of structure, applies only to a limited proportion of the whole number of results, whose explanation must be sought for in the varied interaction of general laws. We find some cases where evolution is a process of simplification of structure, and others where the change is merely qualitative, and does not apparently affect the complexity of the organism in either direction; the barnacle and the caterpillar, which exchanges a brown colouring for a green in response to environment, are cases in point. How great a share of the whole process is due to the action of what may be called degenerative evolution we do not know, neither do we understand under what conditions forward evolution is arrested, and a tendency to increased complexity gives place to a process of simplification. The generalization has been made, "evolution only under adverse conditions, and degeneration only under beneficial conditions." Certainly, any new set of conditions occurring to man or animal which render its food and safety very easily attained seem to lead to degeneration. But that degeneration appears to be no more likely than progression to bring about extinction; we have no reason to believe that parasites are losing ground in the struggle for existence, or that peoples who have been able to establish permanent subordinate relations to a dominant race have

forfeited anything of their fitness to survive. Similarly, if we turn to the experiences of artificial breeding, we find that the failure to produce organisms, which are independent of an artificial environment, is due to the circumstance that those products are violent deviations from an established type when there has been no corresponding variation in the environment. This delicate equilibrium between the parts and between the whole organism and its environment is as necessary to survival amongst the highest as in the lowest forms of life; probably more so, as increased complexity is attended by increased liability to derangement; a reaping machine is more likely to go out of order than a ploughshare. If this be true, increased complexity is no criterion of fitness to survive, but rather tells against the chance of survival.

On the other hand, simplicity of structure cannot be taken as the criterion by which the destructive forces of Nature are guided in their selection. No single characteristic of form or function or assemblage of such characteristics can be indicated as having served in the past, or as likely to serve in the future, as a constant source of danger to the creature possessing it. The conclusion, then, is forced on us that though there has been a very great increase in the number and complexity of both adaptations and misadaptations, there is no evidence to show that either has gained on the other. In short, Nature seems to have formed an exact calculation of the necessities of her creatures.

If the end of increased complexity is not immunity from destruction, and if that and improvement are identical, then immunity from destruction cannot be the end of improvement. Here, it is worth asking, what do we mean by improvement? A fair answer would be, a change which gives us satisfaction; but we can read this in two senses. In one sense, improvement is the elimination of defects and a process usually of simplification; in the other, its object is increased power and change to a new type in the direction of increased complexity. The evolution of the old travelling coach, called a "berline," to the barouche is an example of the first, while the evolution of the motor-car is an example of the second. The superficial student of evolution is apt to understand improvement in the first sense, but what we observe in Nature is of the second kind, and it is immaterial whether the transition be sudden or by imperceptible stages. We cannot regard man as an improved monkey, with faults eliminated and virtues preserved; he is a different animal, but with drawbacks and disabilities greatly increased in manner and variety. For all that, man is an improve-

ment in the strict sense, and his advance in evolution is increased power, but that does not carry with it improved chances of survival. A further distinction between the two kinds of improvement lies in the fact that the first has a more or less definite ideal of perfection up to which to work; the second has no ideal or terminus, but is merely the continuation of an endless process.

Since every organism depends for its continued existence on a nice adjustment between its parts, itself, and its environment, it is pertinent to ask in what sense does Nature make a selection as to what shall survive and what shall be extinguished? Selection is the differential treatment of two objects, which must themselves differ or have different implications; further, the choice must be based on some known criterion and in the case of men there must be free will. Nature, or the environment, is never exactly the same for two consecutive moments, and she reacts on the organism in one of two ways. Thus, if a change occur in the organism with no corresponding change in the environment, the organism perishes usually, being cut off by the environment; in this case we have a criterion, or need for compliance on the part of the organism with some definite standard of adjustment. The second mode of action is quasi-selective and follows a change in the environment without any change in the organism to bring about a corresponding adjustment; in this case those organisms which are affected by the change in the environment perish, and those which are not affected survive. A third mode of natural action is suggested by the ordinary influence exercised by the environment generally on the forms of life exposed to it, but it is difficult to recognize in this anything resembling selection.

We are now in a position to review the position and inquire how far theories of evolution have a bearing on the theory of human conduct. Reasons have been adduced for dissenting from the view that evolution consists always in increased adaptation and decreased misadaptation, or that it is always identical with increased size and complexity of structure, or that increased complexity is the criterion of fitness to survive. It has also been shown that there is a sense in which Nature can be said to select, but when Nature chooses or selects, it is always with the intent to destroy, and the criterion for destruction is incomplete adjustment between the organism and the environment. This adjustment may be dislocated by a change in the organism or by a change in the environment, the risks of dislocation being as great in the higher as they are in the lower organisms, or perhaps greater. So long as a race subsists it is

fit; when it becomes unfit it ceases to exist. Further, in evolution, the term improvement means increase of power, but not elimination of defects, or an enhanced fitness to survive. If purpose is to be ascribed to Nature or the environment, it is merely to provide by its own changes against a stagnant level of life; it evokes order out of chaos, but is indifferent as to what the elements of that order may be. The attributing of purpose to Nature is a result of the impulse to unify facts and experience, an impulse which has been the main factor in man's advancement from savagery. By purpose in man one means a representation in the consciousness which determines action; the purposed result, or end of that action, being the realization of the idea which is represented.

The value of the general argument from evolution is that it embraces the whole of our experiences, and we are justified in assuming that what is found true for the process as a whole will hold good for the subordinate processes by which that whole is constituted. If we find there are reasons for thinking that the general process has been one of the equal concurrent development of both of the contrary processes of adaptation and misadaptation, we may, in the absence of opposing evidence, extend the presumption to such special factors in the sum total as pleasure and pain, or good and evil. In these moral qualities we find the same concurrent progression of both sides of the antithesis, we find a growth in intensity, accompanied by an increase in number and variety in both directions. If the virtues of the savage are fewer and simpler than those of civilized man, so also are his vices. History tells us that the extreme manifestations of depravity and moral grandeur are synchronous, as exemplified by the corruptions of the Roman Empire with the birth of the Christian virtues, or the sublime heroism of the Middle Ages synchronizing with their atrocious crimes. It is notorious that a commonplace age is undistinguished in either way, and every new duty is the occasion of a new virtue or a new vice, according as it is observed or neglected. As the temptations of a great city are greater than those of the country, so also is the strength of moral character which is required for their resistance.

A superficial glance may lead us to think that the growth of moral evil has been preponderant, but we need to remember that evil is manifest by acts of commission, for the most part, which force themselves on our attention; whereas, good consists more commonly in abstentions, inhibitions, and self-denials which escape

observation and can only be inferred. From the analogy of the general facts of evolution, we may regard it as probable that the increase on both sides of the moral equation has been approximately even, and that neither shows a decided balance in its favour. There are many pairs of opposites in moral or human conduct and purpose which obey the same law of parallel evolution, but, as our experience is continually being enlarged by the acquisition of new facts we have no means of comparing the total mass of its contents with what remains still to be admitted. The reasonable supposition is that there is no finite universe of fact, and that, though we may recognize an advance beyond a fixed point, this implies no nearer approach to an ultimate end. Factors which have added complexity to the situation are the number and importance of the nervous processes which have attained consciousness, also our rational and instinctive principles of action, and the functions of the individual and of communities in social evolution. In this sense it is tolerably certain that our difficulties and ignorance are far greater now than they have been at any previous period in history.

A broad view of evolution raises, therefore, a strong presumption that there is no predominance of pain or pleasure, and of good or evil, but that the development of these and other pairs of opposites has been equal and parallel. It follows from this, that birth and death ought to be matters of indifference to us, that the high value we all attach to life is a delusion, and that birth and death are merely devices for maintaining the balance between adaptation and misadaptation, which is necessary for the preservation of the species. The answer to these doubts is, that life is valuable in proportion to the greatness of the positive values which it offers us the prospect of realizing; the life of a free man is of more value than the life of a slave. Here, however, we must remember that life at the same time offers negative values in the same proportion; what the actual resultant value shall be depends entirely for each man upon himself.

We may now approach the question of how human preferences are determined, and what is the general principle which explains why one kind of life or one line of conduct is valued more highly than another. Our surest road to an answer will be to look, not to the motives to conduct, but to the judgments which we pass either on the motives or on the conduct itself. The detection of a universal motive would leave us exactly where we were; if all conduct be governed by the desire of happiness it follows that good conduct is

governed by that desire, as the part is included in the whole, but, for the same reason, bad conduct must also be governed; the only conclusion possible is that the pursuit of happiness cannot be the test of goodness, inasmuch as it fails to distinguish one class of conduct from the other. Our estimate of any specified kind of conduct is based really on the consideration that it helps or hinders the gaining of some end which we regard as good, but the value of that conduct lies not so much in its utility as in the value which we attach to the end it subserves. The end may be bad and the conduct still useful, but it is the reverse of valuable. Now, the ends of human conduct are many and of every degree of value and condemnation, but if we ask ourselves what that end is, the plain and certain answer is, we do not know. The history of evolution discloses no single comprehensive aim to the attainment of which all subordinate processes have been directed; it is not harmony, for the essential characteristic of development is increased conflict; it is not preservation of the species, because the higher and lower are equally liable to destruction, and because the preservation of the species cannot be an end in itself, but explicable with reference to some further end, of which we are in ignorance. Neither can the end be pleasure, for increase of pleasure is always attended by increase of pain; nor, for a similar reason, can it be any other element in human nature in isolation from its opposite; to say it is perfection does not help us, as we know no more about perfection than we do about the other. Since power or increase of force is a constant characteristic of forward evolution, it may be claimed as a final end or aim, but increase of force cannot be regarded as an end in itself, being valuable only as a means to an end. Our search, therefore, for a final end conformable to the exigencies of a teleological explanation is negative. The universal criterion of value is, therefore, approximation to an unknown end, and all evolution up to the present day has taken the form of the parallel progression of opposites, and as long as the same process is maintained it must be impossible to discover that end within the world of experience.

We have just been considering the valuations of human conduct, it is of interest to see how far they agree with the process of forward evolution. In the same way as the latter is endangered by the excessive development of any one principle which disturbs the adjustment of the whole complex to its surroundings, so motives which are usually of a high value cease to be admired when they are in excess. Religion is a motive to human conduct highly valued, but when it is exaggerated or excessive the value

depreciates to condemnation ; a point at which we begin to use the terms bigotry or superstition. If we look into history, the estimates of any one age, like the judgments of an individual on his own conduct, are certain to be biased by the spirit of that age, and its principles of action invested with a fictitious and partial value. When we pass in review the names of men whose title to reverence or renown have stood the test of time, we find that the great men of one age are not always the great men of the next, but their one common asset for recognition is the extent and direction of the influence they have exerted on the fortunes of mankind ; that influence has always been in the direction of advance along the line of progress which separates civilized man from the savage. This criterion is applicable equally to the higher and lower attributes or values ; personal eminence is admired on its own account, but solely as an exemplification of the advance which all of us desire for ourselves. On the other hand, all conduct which degrades a man or threatens others with degradation, is the object of aversion.

There is thus disclosed an interesting parallel between the evolutionary processes of Nature and the mind of man. Man's deeds and desires may be either good or bad, just as the processes of Nature are sometimes beneficent and at others destructive. The parallel development of adaptation and misadaptation, and the narrowness of the margin by which the organism at all stages of evolution maintains its existence, are reflected in the consciousness of man by the parallel growth of his values of morality and his judgments of conduct and purpose. These values fall into one or other of two categories ; they are either of ambition or of goodness, and of self-assertion or of self-effacement. Of this or any other pair of opposites, both are necessary for further development, and if the development is to be healthy and permanent the growth of each must be roughly proportionate to the growth of the other. In all systems of values, the absolute primacy of man is a necessary hypothesis, and the only answer we can give to the question why any specified conduct is good, is that it subserves the end of evolution ; and to this we may add that that end is promoted by the accumulation of force and power, or energy. When, however, we proceed to ask what that end is, we have no answer except that it is not to be found within the limits of experience. We must therefore postulate an end which is external to experience, and a continuation of the same line of thought suggests the assumption of a transcendental personality, because the concept of an end of action implies an intelligence which discriminates one result from

another, and a will to pursue the end which is preferred ; clearly, intelligence and will constitute together personality. No questioning of the facts of experience will help us to understand the nature and attributes of the personality, the bare existence of which we have been compelled to assume ; only one thing is clear, it is that the personality must be entirely different from our own and from all of which we have any knowledge. Beyond this point the argument cannot be carried.

The foregoing argument has led to the conclusion that life, taken as a whole, comprises at all stages of evolution equal proportions of good and evil, highest and lowest, commendable and reprehensible ; and is, therefore, not generally and in itself of a definitely positive or negative value. But it will be conceded that some lives are more valuable than others and that such lives rise above the general level of indifference and must be worth living, whereas others which fall below that level should be declined by every wise man, could he enter on them with a free choice. The force of the argument depends much on what is understood by the term value ; perhaps, the best definition is to say that it is an approximation to an ideal. For it to have any practical effect, an ideal must be such that it presents a reasonable prospect of realization. Now it requires no careful consideration of the past to convince us that no ideal has ever been realized, and that it must have differed widely from what has been the actual result. Thus, the ape could not possibly have foreseen his human descendant, and it is equally impossible for us to foresee what line evolution will take in our case. As, therefore, all ideals are in the nature of forecasts, and have no reasonable chances of realization, the concept of approximation to an ideal is not to be relied on as a test between good and evil, or between what is favourable or commendable and what is not. The real concept of a value is identical with conflict of interests, and implies the concept of a further aim. If there is an ultimate final end which is not absolute, then that, not being the means to another end, has no value, and all our efforts converge to the attainment of a thing of naught. The same is true if there is no ultimate final end ; in that case the ends would have no value, as they would be ends in themselves and not means to any further end. All theories of value postulate an absolute value which is an end in itself, hence that there may be values at all there must be some end which is valuable for its own sake, and not only as a means. It is true that the ends which are valuable in themselves may be many, and certainly the ends of human effort are both many and unconnected. As to what

is the value or end which lends its value to all human ends, we do not know. All human action, therefore, so far as it has value, is directed towards an unknown end; and, as the universal end of Nature is probably identical with the universal human end, that too is unknown.

If the argument has been understood, the reader will appreciate that human estimates of value, or judgments of conduct and purpose, are comparable with the facts of evolution. The characteristic of that process is a continuous increase in all directions, increase in size and strength and dominion over Nature, coupled with increased liability to destruction by disease or external enemies; higher virtues and greater vices; an increased mass of problems which have been solved and of problems which await solution; increased simplicity of knowledge and increased complexity; wider generalizations and a more minute specialization; increased power of individual action and increased strictness of subordination to the common aims of society. Such a survey of the antithesis concentrates our attention as to the close relation of human aims and action to natural evolution, and to the transcendental government of the universe. We have seen that a single ultimate end is postulated by our judgments of value; but when we turn to the facts of experience, our only data, for information as to the precise nature of the final end which we are obliged to assume, we find a vast number of facts of experience which contradict any idea we can form of human purpose. We are, therefore, unable to abandon the assumption of a final end, and are obliged ultimately to accept the conclusion that that end is not to be found within experience; in other words, that it is transcendental and cannot be identified with any human purpose.

When we leave the contemplation of the world as a system of contemporary facts and regard it from the aspect of evolution, we are led by another path to the same conclusion. Not only are the facts there, which are irreducible to purpose, but they have been continuously on the increase, and reasonable expectation compels us to anticipate that, if growth, and not decay, is to be the order of the future, their growth will be continued. Moreover, the growth is not of the anomalous element only, but in all directions, and in this general expansion the various principles are contrary and conflicting, or taking the line of an equal and parallel progression of opposites. The ideals and aims of human conduct are determined by their similarity to, and consonance with, the same processes; or, the sole determinant of man's valuations or judgment on conduct is sympathy with the process of forward evolution.

OBSERVATIONS ON INJURIES OF THE BONES OF THE LIMBS BY THE S. BULLET.

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INJURIES inflicted on bones by the S. bullet (Spitzgeschoss) vary enormously and may be classified. All bullet fractures are compound.

(1) *A bullet grazing a long bone may produce a transverse fracture.*—I have seen an example in the humerus and in the tibia; a thin crack across the middle of the shaft without displacement. The skin wounds healed quickly and the broken bones united firmly. Writers on military surgery describe this kind of fracture as rare.

(2) *A bullet may completely pierce the shaft of a bone.*—There are usually some fragments of bone at the aperture of exit. Perforation of a long bone by a bullet without fracture is an uncommon effect in the middle of a bone, but not in the cancellous tissue of the lower end of the femur and the upper part of the tibia. I have seen three cases, one in the femur and two in the tibia. The example in the femur was caused by a shrapnel bullet (fig. 1).

(3) *The bullet may embed itself in the bone with only slight damage.*—The condyloid end of the femur is the favourite place for such an occurrence. I have seen four examples, two being under my care: in two the bullet entered base foremost (figs. 2 and 3).

In discussing the embedding of bullets in bone reliance cannot absolutely be placed on radiograms. A bullet may appear to be embedded in bone, but when the surgeon attempts to remove it the bullet will be found in tissues not even in contact with the bone. In the "Report on the Surgical Cases in the South African War, 1899-1902" there is a radiogram showing a Mauser bullet in the tibia just above the inferior articular facet. It is stated on p. 274 of the Report, that the bullet "entered above the patella while the knee was flexed to a right angle, passed through the head of the tibia, and into its medullary canal, finally lodging just above the ankle-joint. The tibia was fractured at its narrowest part, but the bullet caused no trouble and was not removed." It is a fair comment on this case that there is no proof that this bullet lies within the medullary cavity, or in the substance of the tibia.

(4) *A bullet strikes the shaft of a long bone, breaks and comminutes it.*—This is a common variety of gunshot injury. The bullet may traverse the shaft of the bone and escape from the limb, or it may lie among the broken pieces of bone. The

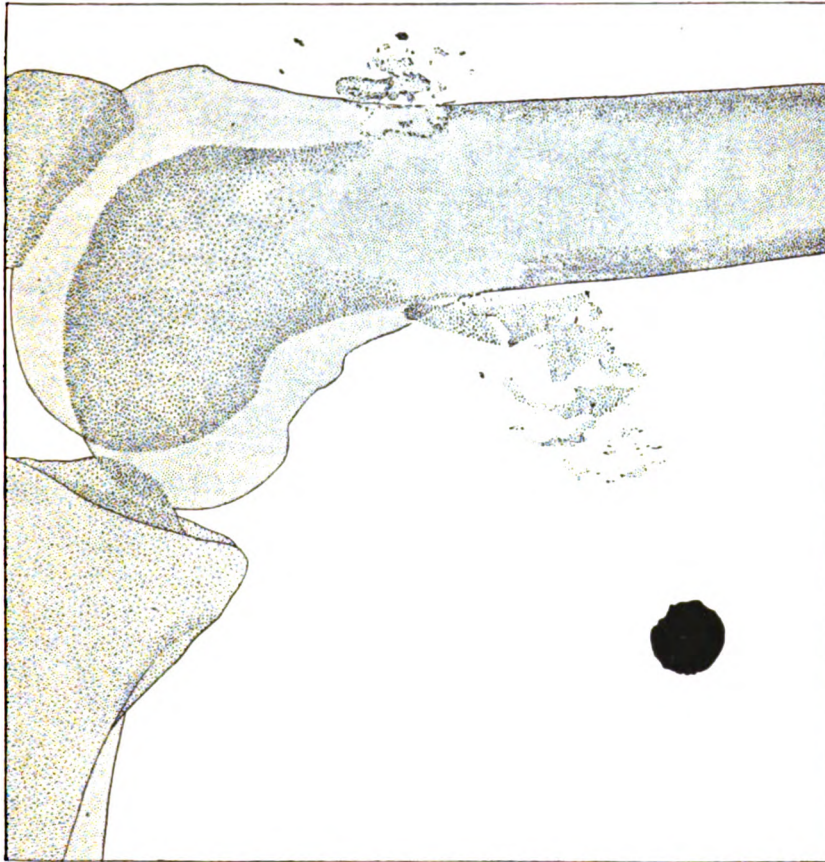


FIG. 1.—The lower third of the femur of an officer wounded at Ypres. A shrapnel bullet perforated the femur and lay under the skin in the popliteal space. (From a radiogram.)

number of fragments varies. When the bullet pierces the shaft of a bone it often produces a stellate or "butterfly" fracture in which four oblique fissures radiate from the bullet tract (fig. 4). The best examples of butterfly fracture I have seen were in the radius, the ulna, the lower part of the humerus, and the middle of the fibula.

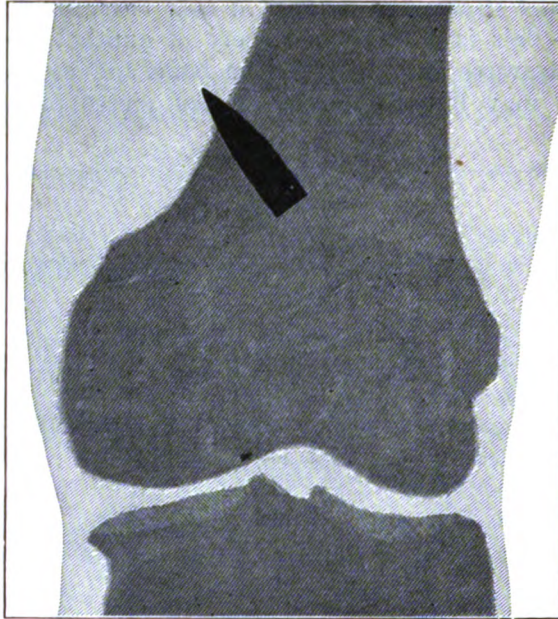


FIG. 2.—A bullet embedded, base foremost, in the femur near the adductor tubercle.
(From a radiogram.)

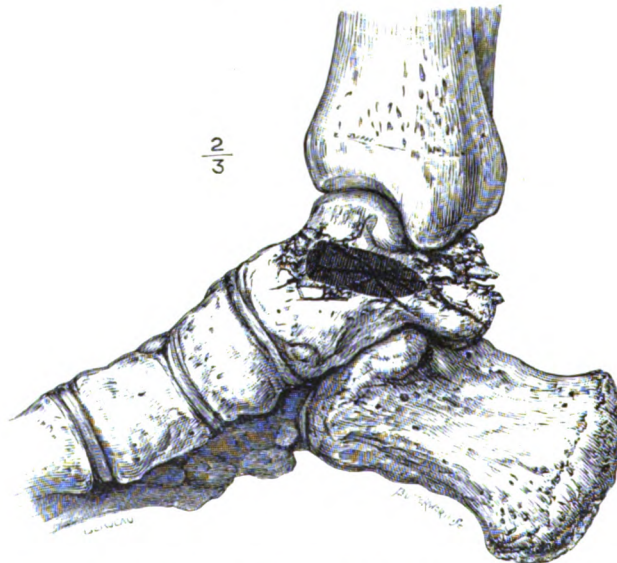


FIG. 3.—The bones of the ankle-joint. A bullet is embedded in the astragalus. It entered the bone from the heel, base foremost, and was extracted through an incision on the dorsum of the foot by Lieutenant J. St. A. Titmas. (This figure is constructed from a radiogram.)

The flattened surfaces of the shafts of these bones seem to favour the production of this variety of fracture. When there is only one wing to this imaginary butterfly it is called a "wedge" fracture. Often one wing of the butterfly is represented by several fragments. Many bullet-fractures of the shafts of large bones are variations of the butterfly pattern.

(5) *A bullet strikes a long bone near a joint and breaks the end of the bone into small fragments.*—Briefly, the effects of the bullet on long bones may be summarized thus:—

The *S.* bullet may simply graze the surface of the shaft of a long bone and break it, or traverse the shaft of the bone and leave a clean tunnel, or embed itself in the bone. More frequently it breaks and comminutes the bone, and occasionally, especially at the extremities of long bones, reduces the osseous tissue to fragments. I am interested to ascertain the factors that lead to such variations in the effects produced by this bullet.

The *Spitzgeschoss* is a short, pointed bullet weighing one hundred and fifty-four grains. It has a solid core of lead enclosed in a ferro-nickel case, or mantle, deficient at the base (fig. 5). The object of the point is to lessen the resistance of the air and the nickel mantle is necessary, lead being too soft to follow the rifling of the barrel. Grooves cut by the rifling can often be seen on bullets removed from wounded men. The pointed end of the *S.* bullet tends to make it somersault.

The English service bullet, Mark vii, weighs one hundred and seventy-four grains. It has a cupro-nickel mantle and a core of lead. Near the point there is a cone of aluminium commonly called "the jockey" (fig. 6, *b*); it is required to maintain a correct balance of the bullet when in flight. The aluminium cone is completely covered by the nickel sheath or mantle.



FIG. 4.—Radius and ulna, showing a "butterfly" fracture. (Semi-diagrammatic.)

Nickel-coated bullets may be deformed in various ways by striking hard bodies:—

(a) The nickel mantle is often stripped off and curls up (fig. 5, c).

(b) After stripping; the lead core may remain coherent (fig. 6, a) although irregular in shape.

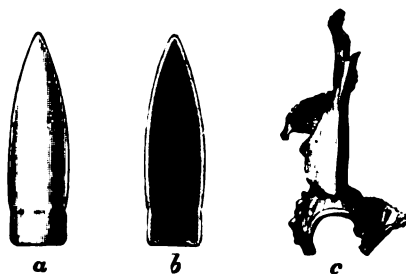


FIG. 5.—(a) A Spitzgeschoss (natural size); it weighs one hundred and fifty-four grains. (b) A Spitzgeschoss in section, showing the lead core and the nickel covering. (c) The nickel covering stripped from the bullet and twisted by impact against a hard body, such as a stone.



FIG. 6.—(a) The deformed but coherent core of the S. bullet. This missile passed through a soldier's neck and killed him; it then lodged in the arm of another and divided the musculo-spiral nerve. (b) The English service bullet, Mark vii, in section, showing the aluminium cone, or jockey.

(c) The lead core may break up into pellets. This is known as fragmentation.

The globular shrapnel bullet rarely breaks up in the body; it does not obtain sufficient velocity.

A bullet fired from a rifle has two motions, one of translation in its long axis and the other of rotation on its long axis. Occasionally a bullet spins on its short axis, a motion commonly referred to as a somersault. Briefly, mantled bullets on impact may retain their shape, or strip. If they strip the mantle curls

up and the lead core may remain coherent, or break up into pellets. The effect on living tissues depends on the behaviour of the bullet. The deformation of a bullet probably depends on the resistance of the body and the velocity on impact. This is, in some measure, supported by the condition of impacted bullets which have somersaulted. These bullets are usually embedded in bone. A bullet that spins on its transverse axis is a bullet moving with much less velocity than one rotating on its long axis. Thus the former on striking a bone embeds itself, whilst the latter may perforate the bone, fracture it, or convert a segment of it into bits.

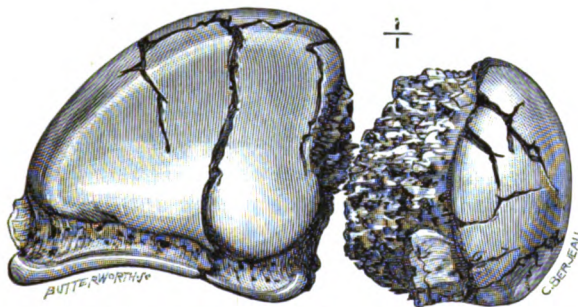


FIG. 7.—Fragments of an astragalus traversed by a bullet. It was broken into seven pieces. Excised from an officer sniped at Gallipoli.

The reversed bullet in fig. 3 embedded itself in the astragalus. Compare this with the astragalus, fig. 7. In this case an officer was sniped at Gallipoli, April 28, 1915. The bullet entered the astragalus near the external malleolus, emerged below the inner malleolus, and broke the astragalus into seven pieces. These I excised, May 24; the fragments were soft and the pieces of bone were kept coherent by the articular cartilage. The other tarsal bones were intact.

It is necessary to emphasize this, because a report has been circulated that the German soldier, with the idea of increasing the damage caused by the *S.* bullet, pulls it out of the cartridge case and re-inserts it base foremost. Such a manoeuvre diminishes its velocity, accuracy of fire, and maiming powers. Observations on wounded soldiers show conclusively that bullets reversed on entering the body do less damage than those entering point foremost.

In civil practice, a comminuted fracture with little displacement of the fragments will, in most cases, unite; the bony fragments, soldered together with callus, make a rough but efficient bond of

union, and a useful limb is the result. In compound fractures the effects are different, especially if the wound become septic. The detached pieces of bone die and the broken ends of the shaft necrose. The majority of bullet-fractures acquired in this war become septic, and afford many opportunities for surgeons to acquire a knowledge of the unfavourable conditions of wounds prevalent in pre-Listerian times.

The method that gives me best results in septic bullet-fractures is to open up the wounds and remove the detached fragments; then thoroughly flush the cavity with solution of peroxide of hydrogen, or tincture of iodine, and drain the cavity freely. These stinking wounds, as a rule, quickly sweeten and granulate.

A severe case of bullet wound of the scapula came under my care shortly after the battle of Neuve Chapelle, March 11, 1915:—

B., aged 44, received a bullet in the right axilla: it passed through the middle of the scapula. The man was left on the field as dead. About forty-eight hours later, hearing some men talking he shouted to them, and was recognized by a soldier belonging to his own company. A stretcher party brought the wounded man into the lines. Eight days later he came under my care, very ill and rambling. There was a small hole in the axilla and a large oval opening on the skin overlying the scapula; through this opening bubbles of gas escaped. On culture, the stinking pus yielded streptococci, coliform bacilli of two varieties, and *Bacillus capsulatus aerogenes*. Fragments of bone could be seen in the wound, and a radiogram showed that the scapula was broken into many pieces. I excised the scapula (fig. 8). There was a large abscess in the suprascapular fossa, one in the infrascapular fossa, and the shoulder-joint contained pus. The joint was infected through the line of a fracture involving the glenoid fossa. A peculiar feature of each abscess in this case was the presence of a thick membrane of the same consistence as the white of egg when boiled. On opening the shoulder-joint the capsule was lined with this material in such a way that I thought an echinococcus cyst had been opened. The patient made a quick and uneventful recovery with a useful arm, for none of the main nerve-trunks were injured.

This scapula differs in an important particular from all other badly fragmented bones I have examined. When a bone is broken into many small pieces, if the radiogram be carefully examined many small leaden pellets can be seen scattered among the pieces of bone. I feel sure that in many examples of severe fragmentation of bone the damage is often caused by the breaking up of the leaden core of

the bullet after its mantle has been stripped off. This view is supported by observations on the wounds of bone caused by shrapnel bullets. These bullets, as far as I can ascertain from the wounds of soldiers under my care, rarely break up; yet they move with a velocity that enables them to perforate the shaft of the femur.

The destructive effects of bullets on the bones of the upper limb, although they necessitate the removal of considerable portions of the joint-ends of the bone, can often be treated on conservative

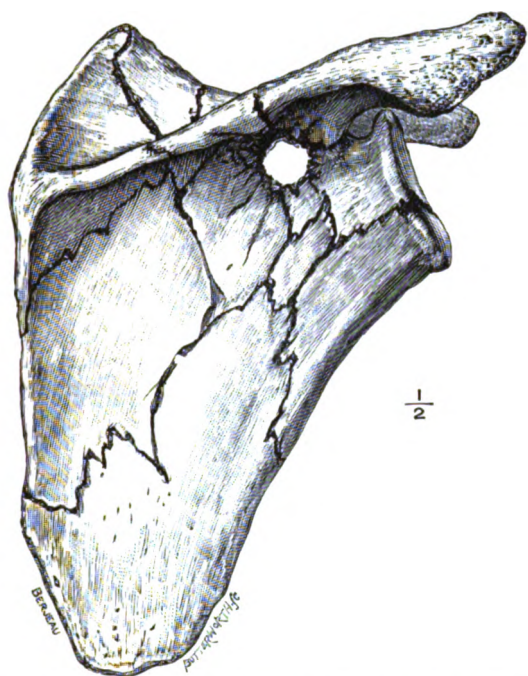


FIG. 8.—A scapula broken by a rifle bullet at Neuve Chapelle. The bullet entered the axilla. The bone was excised. The soldier recovered with a useful arm.

lines, even when septic, and leave the soldier with an impaired but useful limb. It is otherwise in the case of the lower limb. Extreme comminution of the bones at the ankle and at the knee, especially when the wound is septic, leads to amputation, and the damage caused to the head of the femur, the acetabulum, and adjacent parts of the pelvis occasionally ends, even with all the resources of modern surgery, in death. Those who survive are often impeded with a cumbersome and useless limb, after a prolonged and very distressing

illness. The femur is very frequently broken by bullets and such fractures are very serious and dangerous. Wounds of the upper end of the femur, especially if they involve the hip-joint, are very fatal injuries.

C. G. Spencer, in his "Manual on Gunshot Wounds," recommends that all septic fractures require exploration; the exit wound must be opened up and all loose fragments removed. Necrotic pieces of bone give endless trouble and keep the sinuses open for months or years, and repeated operations are required for their removal. Detached fragments of bone can be found easily within a short time of the injury, but when they become surrounded with callus they require a long series of troublesome operations for their removal. This excellent advice may be crystallized thus: *Prompt removal of loose fragments of bone saves the soldier much suffering, shortens convalescence, and lessens the risks of secondary hæmorrhage.*

A good radiogram is of the utmost service to the surgeon when removing fragments of bone. I always have it in the operating room at the time of the operation and use it as a chart. In this way the pieces of bone can be removed with a minimum disturbance of the soft parts.

A remarkable feature of septic gunshot fractures is the rapidity with which the osseous tissue softens; this is well illustrated in the following cases:—

A soldier, aged 25, was hit in the hip by a bullet at Ypres. Ten days later the wound was explored, and the bullet removed from the neighbourhood of the hip-joint. Twenty days later a radiogram showed a fracture involving the acetabulum. As the man did not improve I explored the wound, and found that a piece of bone had been broken from the edge of the acetabulum; the joint was septic. Three weeks later (eight weeks after the injury) a radiogram showed that the head of the femur had disappeared and the neck of the bone was resting on the back of the ilium. I excised the upper end of the bone at a point half an inch below the lesser trochanter. The head of the femur and the subjacent portion of its neck had been completely digested by the action of micro-organisms in less than two months. The soldier slowly recovered.

A remarkable example illustrating the disorganizing effects on bone of micro-organisms is represented in fig. 9. A soldier, aged 19, was hit in the right buttock by a bullet. It entered the hip-joint and chipped a piece off the head of the femur and fractured the acetabulum. At the 3rd London General Hospital he came under

the care of Lieutenant H. A. Lucas. A month after the injury the wounds were suppurating freely, the soldier was in a gravely septic condition, and a radiogram showed a dislocation of the hip-joint. Lieutenant Lucas excised the upper end of the bone and found the disk-shaped epiphysis of the head of the femur lying loose in the acetabulum.

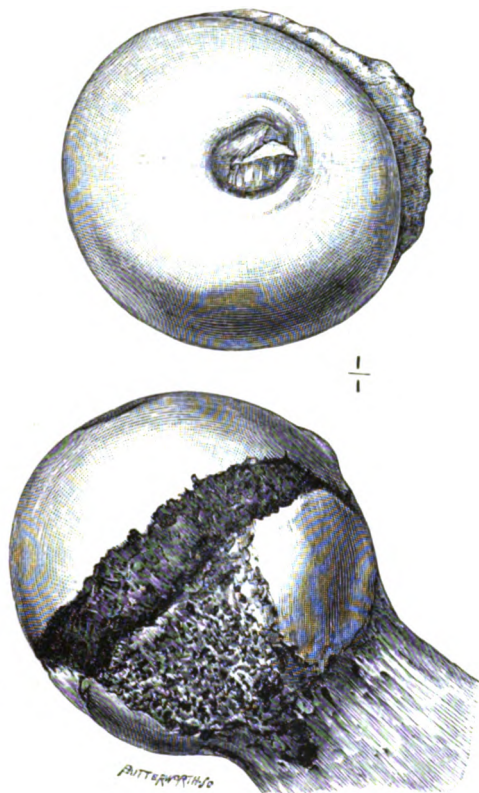


FIG. 9.—The head and a portion of the neck of a femur. The hip-joint was damaged by a bullet, and the epiphysis of the head of the bone, separated by a septic process, lay loose in the acetabulum. From a soldier, aged 19.

It is a matter of common observation that gunshot wounds of the leg are more serious than those of the arm. This difference is expressed in the Italian epigram :—

Braccio in petto,
Ma gambe in letto.

(Arm on the breast, but leg in bed.) Wounded in the arm a soldier can walk about ; wounded in the leg he must rest in bed.

A MOBILE FILTER OF LARGE CAPACITY SUGGESTED FOR USE IN THE BRITISH ARMY.

BY LIEUTENANT-COLONEL G. G. NASMITH.

Commanding Canadian Mobile Laboratory, British Expeditionary Force.

THAT impure water is capable of producing more disease than almost everything else put together in an army in the field is realized by every sanitarian. That the present European War has proved this beyond all doubt is familiar to the sanitarian who knows the medical history of the various armies. And that the water problem will be of even greater importance as the summer season advances may be readily admitted.

Enteric fever, dysentery, and cholera, to say nothing of the milder diarrhoeas, are largely water-borne diseases. With Europe overrun with millions of troops, many of them "carriers" of disease germs, the means are at hand for great outbreaks of enteric disease, unless certain and continuous means of combating them are undertaken.

The record of the British Army to the time of writing with regard to preventible diseases is an enviable one, and in itself speaks volumes for the sanitary measures that have been taken. Anti-typhoid inoculation has, undoubtedly, been responsible to a large extent for the prevention of enteric fever. But anti-typhoid inoculation will not prevent dysentery or paratyphoid fever or cholera. The latter has not made its appearance at all in the West of Europe as far as we know. Dysentery, as such, also seems to be unknown in the British Army. Paratyphoid organisms have been separated in a fairly large proportion of cases diagnosed clinically as enteric fever.

That enteric diseases have not made their appearance in the British Army may be accounted for in several ways, namely, by :—

- (1) Anti-typhoid inoculation.
- (2) Disinfection of the water supply of the troops by chlorine.
- (3) Cold weather ; during cold weather men prefer tea and soup made from boiled water, and will even fill their water-bottles with boiled water. In other words, the desire for liquids in winter is at the minimum.
- (4) Sanitary precautions taken to dispose of excreta, and providing baths and facilities for personal cleanliness.
- (5) Lack of flies during the winter months.

The season is now changing, however, and the time is at hand when flies will abound and when the Army will demand water in infinitely greater quantities.

The supplying of a continuous and adequate supply of pure water to an army in the field is an exceedingly difficult problem. In the British Army the system is such that each water-cart is made a complete unit in itself; a unit capable of taking a dirty, polluted water and both clarifying and disinfecting it. In theory, such a system is ideal, and is certainly the best that we have ever had. In practice, however, certain weaknesses have developed in this system which are of great importance.

In the first place, the tremendous strain put upon these water-carts has developed certain mechanical defects which have put the clarifying apparatus out of action for greater or less periods, and chlorination has been the only thing that has stood between the men and water-borne disease. Chlorination is all right as long as the water is clean, but chlorine will not thoroughly disinfect water that contains particles of solid material in which germs may be locked up.¹ In other words, with unclarified, incompletely disinfected water, or with clear unchlorinated water there are as many possible sources of enteric disease outbreaks as there are water-carts. The men in charge of the carts may be careless, or become sick, or be taken away from them, and be replaced by less expert men, with the net result that failures are bound to occur.

Then the failure to add just the requisite amount of hypochlorite of lime results in either under-dosing or over-dosing. The former results in failure to destroy pathogenic organisms; the latter produces an objectionable taste and drives the men to drink any other water than that which has been so treated. In checking the results of chlorination of the water supply of the Canadian Division in the laboratory both of these results have been met with. It is only fair, however, to state that in this case the bacteriological efficiency has been very good, and that neither under- or over-chlorination has been the rule.

The water problem is now assuming a new aspect in the area occupied by the British Army. The wells are, as a rule, very shallow and very frequently are quickly dried up when used as sources of supply for the Division occupying the area. This has

¹ [A test cabinet has been supplied to the medical officer of each unit to enable him to determine the amount of chlorine required for the disinfection of unclarified or partially clarified water.—Ed.]

already occurred, with the result that the water-carts have, in some cases, been compelled to go several miles for water from supplies which were both copious and presumably pure. In other words, the frequently expressed opinion of army sanitary officers that wells are incapable of supplying an army in the field is being proved to be true.

As the summer advances and more water is used the following conditions will arise :—

- (1) The soldier will no longer drink tepid boiled water.
- (2) He will drink large quantities of water—no matter where it comes from.
- (3) Wells will not be available as sources for the army except to a minor extent.
- (4) In many cases, rivers, lakes, canals and ponds will, of necessity, be resorted to. Needless to say, they are polluted beyond description, as analyses have already demonstrated.

The problem seems to the writer to resolve itself naturally into two divisions, namely, the water supply for the men in the trenches, and the supply for those in reserve.

For those in the trenches, to whom water must be carried in at night, there are several ways of attacking the problem.

(1) By supplying the individual with tablets of bisulphate of soda to put in his water bottle and disinfect the water. This is being done, but can only be considered an emergency method, because many soldiers quickly tire of the taste and refuse to use this agent, which is moreover a bulky one.

(2) By supplying chloride of lime and thiosulphate tablets by means of which a pailful of water may be sterilized effectively by the chlorine, and any taste subsequently destroyed by the thiosulphate. This may be done in the trenches or at the source of supply, and is being tried out by one division to a limited extent. Or a liquid stock solution of hypochlorite solution may be kept on hand, and the necessary quantity added to each rum jar or pail of water as it is brought into the trenches. This is also being used to some extent.

(3) By erecting at each place near the trenches used as a source of water supply, a barrel or cask fitted with a tap. This can be filled and chlorinated, and all water used drawn from it.

For those not in the trenches the water supply could best be obtained at central points, to which the water carts should go, and be filled with water purified at these central points.

This method involves the use of large mobile filtering and

chlorinating units, which must be capable of turning out a large quantity of purified water in a small space of time. Such a filtering unit must have the following features:—

(1) It must not weigh too much, that is, it must be capable of being drawn by horses or set up on a motor chassis. In other words, it must not weigh complete more than two and a half to three tons.

(2) It must be self-contained, that is, it must have gasoline driven centrifugal pump; apparatus for accurately adding alum and hypochlorite solution, and filtering apparatus all in the one unit.

(3) The filtering surface must be capable of being easily cleansed, or, better, of cleansing itself automatically.

(4) It must be mechanically substantial, and capable of standing hard usage in the field.

In the first place there is no such apparatus on the market.¹ I am convinced, however, that the most recent method of filtering water, which is now being installed in the city of Toronto, Canada, could be easily adapted to this purpose.

The system is known as the drifting sand filter, and is unique in that it is a combination of the old slow sand filter and the mechanical filter. Alum is used as a coagulant, but instead of the precipitated dirt settling out on a flat surface, as in the ordinary mechanical filter, and thereby gradually choking the surface, it settles on sand pyramids or cones, the surfaces of which slowly drift down to the sides, and are drawn off with the entangled alum flock and dirt. The dirty sand is then washed automatically free from dirt, the dirty water (less than one per cent. of that pumped) is carried off to one side, and the clean washed sand is trapped and carried to the top of the filter by the inflowing water to be clarified.

As a preliminary to the consideration of this plant by the City of Toronto, three distinct experimental plants were built, the largest being a single unit, with a capacity of 500,000 gallons a day, and the smallest a four by six foot multiple unit. The latter had four whole cones, eight half cones, and four quarter cones, and worked from the mechanical and physical standpoint just as well as the half million gallon single unit. The large plant, which underwent an official test by the writer for a period of thirty-five days, was in every way satisfactory, removing in that period

¹ [There are several plants of English make available, and these, as well as the one described by the writer, have already been ordered for the purpose of supplying water to divisions.—ED.]

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98.5 per cent. of the bacteria present. No attempt was made to investigate the smaller two experimental plants from the bacteriological standpoint.

Seeing its potential possibilities for use in the field, the writer asked the inventor of the system to prepare designs of a mobile unit, with a view to its use with the Canadian Division. Time and circumstances were not then favourable, and later on it was found that another system was in vogue. The necessity of the occasion makes one feel that anything which may improve the health of our Army in the field should be suggested now.

This mobile filter unit would be capable of delivering at least fifteen hundred gallons of clarified, disinfected water per hour; or enough to fill about fifteen water carts. A great advantage in this respect is that one destroys bacteria first, and then filters them out; in other words, one filters dead bacteria. There are many obvious advantages to such a scheme, one of them being that the purification of the water would be taken out of the hands of a large number of men, and placed in the hands of a few competent men. Besides this, the water can be over chlorinated, and the excess of chlorine subsequently removed if necessary.

The unit would be self-contained, and could be easily moved from area to area to filling points, or it could be even utilized to fill standing or mobile water tanks from which the water carts could in turn be filled.

The greatest danger from the sanitary standpoint is untreated drinking water. Epidemics of intestinal disease have in nearly every war carried off more victims than the arms and devices of the enemy. These water-borne intestinal diseases can be prevented to a great extent, and every possible means should be seized upon to see that they are prevented.

ON STERILIZATION OF WATER FOR DRINKING PURPOSES IN THE FIELD BY MEANS OF CHEMICALS.

BY CAPTAIN W. R. GALWEY

Royal Army Medical Corps.

THE past few years have brought again the subject of purification of drinking water in the field, by means of chemicals, prominently before the minds of military sanitarians. The fragility and difficulty in transport of batteries of Berkefeld candles and heat exchange apparatus has forced us to examine again the claims of various substances as sterilizing agents. Of these the group of halogen elements have yielded the best results. Good results have been gained by permanent installations in various cities in England, on the continent of Europe, and in America, in which chlorine in some form is the purifying agent: 0.4 to 2.5 parts of free chlorine per million appears to be the proportion most generally used, but Hill shows that the action of bleaching lime depends not only on the degree of pollution, but on the nature of the bacteria present. He states that spore-forming bacteria are very resistant. Organic matter has also a great effect on the sterilizing action. He concludes that chloride of lime alone is only rarely sufficient for contaminated waters.

Various techniques have been tried for sterilizing by chemicals under field service conditions. Nessfield has found iodine liberated from "tabloids" of potassium iodide and iodate to be the most effective. He also claims to have had good results with chlorine, and has devised a method of delivering the gas from cylinders with a contrivance for measuring the exact amount of gas passing out.

Nasmyth and Graham rely on bleaching lime and detail a very simple technique for preparation of a solution containing the necessary amount of free chlorine. They state that muddy waters require preliminary straining.

Treherne and Nelson have devised a method of adding chlorine gas in watery solution to the water to be treated. Their apparatus has been extensively tested in the Southern Army in India during the past year; and though opinions have differed somewhat most observers agree that their method is of real use. The chief objections which have been raised against their apparatus are that it is fragile and that it is difficult to arrive at a constant strength of chlorine in solution. Also, in muddy water preliminary clarification appears to be necessary. It must be remembered, however, that

the apparatus which has been used up to date has been largely experimental and that various parts of it are being modified by the inventors.

Quite recently Sims Woodhead has also detailed a technique for using bleaching lime which appears simple, easily adjustable and requires little expert knowledge.

The two series of experiments about to be detailed were undertaken for two purposes :—

- (1) To test the efficacy of the Treherne-Nelson technique.
- (2) To compare the values of the different chemicals advocated.

After the completion of the first series of experiments I came to the conclusion that too small quantities of water were used, and in the second series I endeavoured to make my examinations of a more searching character.

In all experiments in purification of water certain difficulties are met with, e.g. :—

(1) The technique for recovering pathogenic germs, such as *Bacillus typhosus* and *B. dysenteriae*, is by no means perfect. It is quite possible to fail to recover these organisms in small quantities of water, even though they may not have been killed by the chemical reagent used.

Further, Clemesha has shown how quickly typical intestinal germs are outgrown by the more resistant types met with in water. In several experiments I have failed to recover the pathogenic germs used even from the controls, so that the action ascribed to chemicals may in reality be due to the struggle for existence between pathogenic and saprophytic germs.

(2) The conditions of natural contamination are hard to reproduce. In a cholera-infected well or tank it is practically impossible to say what the contamination per cubic centimetre may be. Any laboratory experiment must, therefore, be more or less artificial, and contaminations will probably err on the side of excess.

(3) It is possible that the pathogenic germs used—laboratory stock cultures—may be more resistant than those infecting a water supply under natural conditions ; for they have lived under saprophytic conditions for indefinite lengths of time.

In my second series of experiments I have endeavoured to overcome these difficulties by :—

- (1) Using selective media favouring the growth of the particular organism dealt with.
- (2) Adding known quantities of these organisms.
- (3) Using a fairly large amount of water, both in the test and for the cultures made to determine the sterilizing effect.

SERIES I.

Experiments on the Value of Free Chlorine as a Purifying Agent for Drinking Water.

The following experiments were undertaken with a view to determine the value of chlorine gas in solution as a means of purifying contaminated water for drinking purposes.

The technique employed for making the solution was that recommended by Colonel Treherne, and Captain Nelson, I.M.S.; and the quantity of chlorine used was one part of chlorine in 500,000 of water.

Experiment 1 was undertaken with a view to testing the efficacy of chlorine in purifying grossly contaminated natural water.

To 2·5 gallons of water from a grossly contaminated stream 0·5 ounce of chlorine solution was added, giving a proportion of 1 in 500,000 of free chlorine. Before adding chlorine controls were made by smearing 0·01 c.c. of the water on a neutral "red bile" salt lactose agar plate, and 0·1 c.c. on an ordinary agar plate.

0·1 c.c. of water was smeared on the same kinds of plates, fifteen, thirty, forty-five, and sixty minutes after the addition of the chlorine solution. The result of the experiment was as follows:—

	N.R.B.S. lactose agar		Ordinary agar	
Control	0·1 c.c., sterile	..	0·1 c.c., 1,360 colonies per cubic centimetre.
0·1 c.c. water after 15 minutes' contact with chlorine ..	Sterile	..	..	800 colonies per cubic centimetre.
0·1 c.c. water after 30 minutes' contact with chlorine	160
0·1 c.c. water after 45 minutes' contact with chlorine	150
0·1 c.c. water after 60 minutes' contact with chlorine	Sterile.

All the ordinary agar plates except that after sixty minutes contact showed moulds which were included in the count.

The sterility of the N.R.B.S. lactose agar plates all through this experiment could not be accounted for, as in many other experiments in which water from the same stream was used there were abundant lactose fermenters even in 0·1 c.c.

Experiment 2 was made to ascertain if chlorine is effective in sterilizing water contaminated with a specific pathogenic germ in such a manner as might occur in nature. One ounce of urine of an enteric convalescent, who was excreting large numbers of *B. paratyphosus* A daily, was added to one gallon of tap water (the tap

water in Wellington contains some 200 to 300 bacteria per cubic centimetre). A control plate was made and chlorine 1 in 500,000 added. The medium employed was Conradi-Drigalski: One cubic centimetre of water was added to the melted medium and the plates were then spread, allowed to set, and incubated at 37° C. until next day. Colonies were picked off and tested with high titre serum of an animal immunized against *B. paratyphosus* A.

The result of the experiment was:—

Control plate	..	..	..	..	<i>B. paratyphosus</i> A recovered.
After 15 minutes' contact with chlorine	..	..	..	..	" "
" 30	"	"	"	..	" "
" 45	"	"	"	..	" "
" 60	"	"	"	..	" "

Experiment 3.—Since the chlorine solution used in the last experiment had been prepared a day before use, and it was possible some leakage of gas had occurred, the above experiment was repeated using freshly prepared chlorine solution. *B. paratyphosus* A was recovered up to sixty minutes after treatment of the water with chlorine.

Experiment 4.—The amount of urine used in the above two experiments gave a very great contamination (1 in 160), much higher, indeed, than would be likely to occur in nature; I therefore reduced the amount of urine from the same paratyphoid A carrier to one dram in one gallon of tap water. The technique of the experiment was the same as before, fresh chlorine water being used. The result was as follows:—

Control plate	..	..	..	..	<i>B. paratyphosus</i> A recovered.
After 15 minutes' contact with chlorine	..	..	..	..	" "
" 30	"	"	"	..	" "
" 45	"	"	"	..	No <i>B. paratyphosus</i> A.
" 60	"	"	"	..	" "

Experiment 5.—The last experiment was repeated, with the difference that 0.1 c.c. of the water was smeared on prepared Conradi-Drigalski plates and no "shake" cultures were made. No *B. paratyphosus* A was recovered from any plate, including the control. The patient was proved to be excreting *B. paratyphosus* A in his urine the day the experiment was made.

Experiment 6.—To one gallon tap water one dram of a thick emulsion of *B. typhosus* in normal saline was added. A control shake culture was made by adding one cubic centimetre of the contaminated water to melted Conradi-Drigalski medium and plating as in the previous experiment; chlorine was then added in the proportion of

1 in 500,000 and plates were made in the same manner after fifteen, thirty, forty-five, and sixty minutes. *B. typhosus* was recovered from the control plate and after forty-five minutes' contact with chlorine, but not after fifteen, thirty, or sixty minutes' contact.

Experiment 7.—The last experiment was repeated, using *B. dysenteriae* (Shiga). This bacillus was recovered after fifteen, thirty, and forty-five minutes, but not after sixty minutes' contact with chlorine.

Experiment 8.—0.5 dram of an emulsion of *B. dysenteriae* (Shiga) was added to one gallon of tap water, and chlorine added as before. In this experiment I made two series of plates, one by "shaking" one cubic centimetre of water with melted Conradi plates. The result was as follows:—

	0.1 c.c. smear plate	1 c.c. shake plate
Control	<i>B. dysenteriae</i> recovered ..	<i>B. dysenteriae</i> recovered.
After 15 minutes' contact with chlorine	" " "	" not recovered.
After 30 minutes' contact with chlorine	" " "	" "
After 45 minutes' contact with chlorine	" " "	" "
After 60 minutes' contact with chlorine	" " "	" "

Experiment 9.—Ten cubic centimetres of a twenty-hour broth culture of *B. typhosus* was stirred into a large tub of tap water containing about eight gallons. The contaminated water was allowed to stand till next day, and then one gallon was withdrawn and chlorine 1 in 500,000 was added. *B. typhosus* was not recovered from even the control plate.

Experiment 10.—The last experiment was repeated, with the exception that one gallon of water was withdrawn and treated immediately after contamination; smear and shake cultures were made as in Experiment 8. Result:—

	0.1 c.c. smear plate	1 c.c. shake plate
Control	<i>B. typhosus</i> recovered ..	<i>B. typhosus</i> recovered.
After 15 minutes' contact with chlorine	" not recovered	" not recovered.
After 30 minutes' contact with chlorine	" "	" "
After 45 minutes' contact with chlorine	" "	" "
After 60 minutes' contact with chlorine	" "	" "

Experiment 11.—Ten cubic centimetres of a twenty-four hour broth culture of *B. dysenteriae* (Shiga) was added to three gallons of tap water, allowed to stand till next day, and then chlorine 1 in

500,000 added. Both smear and shake plates were made as before.
Result:—

	0.1 c.c. smear plate	1 c.c. shake plate
Control	<i>B. dysenteriae</i> present ..	No <i>B. dysenteriae</i> .
After 15 minutes' contact with chlorine	" " ..	" "
After 30 minutes' contact with chlorine	" " ..	" "
After 45 minutes' contact with chlorine	No <i>B. dysenteriae</i> present ..	" "
After 60 minutes' contact with chlorine	" " ..	" "

Experiment 12.—The last experiment was repeated with a slightly different result:—

	0.1 c.c. smear plate	1 c.c. shake plate
Control	<i>B. dysenteriae</i> present ..	<i>B. dysenteriae</i> present.
After 15 minutes' contact with chlorine	" " ..	" "
After 30 minutes' contact with chlorine	No <i>B. dysenteriae</i> ..	No <i>B. dysenteriae</i> .
After 45 minutes' contact with chlorine	" " ..	" "
After 60 minutes' contact with chlorine	" " ..	" "

Experiment 13.—In order to ascertain the result of mixing *B. typhosus* with normal faecal organisms the following experiment was made: 7.5 minims of a thick emulsion of *B. typhosus* and one dram of thin emulsion of normal faeces were stirred into one gallon of tap water, and chlorine added 1 in 500,000. Shake and smear plates were made. Result:—

	0.1 c.c. smear plate	1 c.c. shake plate
Control	<i>B. typhosus</i> and faecal organisms	<i>B. typhosus</i> and faecal organisms.
After 15 minutes' contact with chlorine	Faecal organisms only ..	Faecal organisms only.
After 30 minutes' contact with chlorine	" " ..	Plate sterile.
After 45 minutes' contact with chlorine	" " ..	" "
After 60 minutes' contact with chlorine	Plate sterile ..	" "

Experiment 14.—Ten drops of a thick emulsion of cholera vibrios were added to one gallon of tap water. Chlorine solution made the previous day was added in the proportion of 1 in 500,000 (free chlorine). Result:—

Cholera vibrios were recovered from the control plate, and after fifteen minutes' contact with chlorine, but not after thirty, forty-five, and sixty minutes' contact.

The following conclusions were drawn from these experiments :—

(1) With a moderate degree of contamination such as would be likely to occur in nature, chlorine in the proportion of 1 in 500,000 prepared according to the Treherne-Nelson technique effectively sterilizes after forty-five minutes' contact.

(2) In using solid media for experiments such as above, smear plate cultures give more accurate results than shake cultures.

SERIES II.

Experiment 1.—One litre of tap water was taken in two flasks, A and B; two cubic centimetres of a twenty-four hour broth culture of *B. typhosus* containing 310,000,000 per cubic centimetre were added to each flask.

To flask "A" freshly prepared chlorine solution (by Treherne's method) one pint in 537,000 was added.

To flask "B" tinct. iodi. one pint in 100,000 was added. After fifteen, thirty, and forty-five minutes' contact 10·5 and 1 c.c. were added to tubes of glucose litmus peptone water. Control tubes containing 5 c.c. and 1 c.c. were also put up from both flasks.

All these tubes showed acid and gas after twenty-hours' incubation at 37° C.

They were then left standing for a further twenty-four hours at room temperature and one platinum loop from each was plated on Conradi-Drigalski plates. After twenty-four hours at 37° C. these plates were examined for *B. typhosus*. Result :—

				CHLORINE			IODINE		
				10 c.c.	5 c.c.	1 c.c.	10 c.c.	5 c.c.	1 c.c.
Control	—	+	+	—	+	+
15 minutes	+	±	+	+	+	+
30 "	+	+	—	+	+	+
45 "	—	—	+	+	—	+

+ means organism present which agglutinated in high titre *B. typhosus* serum.

Profuse growth on all plates but few *B. typhosus* colonies, particularly on the later plates. These *B. typhosus* colonies were not typical in appearance and clumped slowly in high titre sera.

In this experiment the contamination used was very high, about one half to one million bacilli per cubic centimetre of water, i.e., much higher than might be expected to occur in nature, and though chlorine and iodine failed to completely sterilize they killed off a percentage and altered the characteristics of others.

Experiment 2.—This experiment was undertaken to compare the times required to treat water by heating up to 75° C. and cooling to 42° C., and to prepare the Treherne-Nelson chlorine

solution and treat water with it for half an hour. The efficiency of the two processes was also compared.

Five gallons of grossly contaminated stream water was placed in two galvanized iron tubs such as are used for boiling water in camp; 2,000,000,000 *B. typhosus* were added to each. I prepared chlorine for one tub while my assistant lighted a fire to boil the water in the other. The chlorine water required twenty minutes to make and the whole process took fifty-five minutes. The water was brought up to 75° C. in forty minutes and took fifty-seven minutes to cool to 42° C.

A control neutral red bile salt lactose agar plate was made by smearing 0.1 c.c. of water immediately after the chlorine had been added. Numerous *B. typhosus* were recovered from the chlorinated water after thirty minutes' contact, but only a few of the ordinary lactose fermenters of water. No *B. typhosus* was recovered from the heated water. The latter showed 210 lactose fermenters per cubic centimetre.

In this experiment the chlorine was added to a very open receptacle so that a certain amount of gas may have been liberated to the air.

Experiment 3.—This experiment was undertaken to show the relative efficacy of tincture of iodine, calcium hypochlorite, and chlorine water as sterilizing agents for water contaminated by cholera. Two and a half gallons of tap water were placed in each of three tubs, A, B, C. To each 1,200,000,000 cholera vibrios in alkaline peptone water were added:—

To tub "A" .. 100 minims tinct. iodi. was added, about 1 in 200,000.

To tub "B" .. 1½ drams of calcium hypochlorite, prepared by Nasmyth and Graham's formula. This bleaching lime contained 19 per cent available chlorine.

To tub "C" .. ¼ oz. chlorine water made by Nelson's formula, i.e., 1 in 500,000.

Twenty cubic centimetres from "A" tub were added to three flasks containing 5 c.c. of 5 per cent alkaline peptone water after five, ten, and twenty minutes' contact with tinct. iodine. Twenty cubic centimetres from "B" tub were added to 5 c.c. of 5 per cent alkaline peptone water after ten, twenty, and thirty minutes' contact with bleaching lime. Twenty cubic centimetres from "C" tub were added to 5 c.c. of 5 per cent alkaline peptone water after fifteen, thirty, forty-five minutes' contact with chlorine water.

The cultures were incubated for twenty-four hours at 37° C. and modified Dieudonné medium made from them. These were examined twenty-four and forty-eight hours later. Result:—

Iodine—

Control	+	+	
5 minutes		+	
10 "		+	Scanty growth on Dieudonné plate.
20 "		+	1 colony on Dieudonné plate.
30 "	+	+	

Bleaching Lime—

Control	+	+	
10 minutes	+	+	Subcultures on Dieudonné plate showed abundant growth.
20 "	+	+	
30 "	+	+	

Chlorine—

Control	+	+	
15 minutes	+	+	
30 "	+	+	Scanty growth on 30 and 45 minute Dieudonné plates.
45 "	+	+	

The cholera red reaction was uncertain in all the peptone tubes after twenty-four hours' incubation, but the vibrios were found microscopically.

In this experiment the best results were obtained with tinct. iodi. But the sample of bleaching lime contained a low percentage of available chlorine. It was obtained from a local chemist.

Experiment 4.—Was undertaken to test the relative efficiency of chemicals in killing *B. typhosus*. Two and a half gallons of foul stream water were taken in each of three tubs, A, B, C, 1,400,000,000 *B. typhosus* (twenty-four hour broth culture) were added to each.

To tub "A" iodine was added	..	In the same proportion as in Experiment 3.
To tub "B" chlorine was added	..	
To tub "C" bleaching lime was added	..	
from each tub		

Twenty cubic centimetres of water were added to flasks containing five cubic centimetres five per cent glucose bile salt neutral red broth after varying intervals.

The cultures were incubated at 37° C. till the following day. All showed acid and gas; Conradi-Drigalski plates were then smeared with one loopful from each flask. Result:—

Iodine—

Control	..	<i>B. typhosus</i> recovered.	
5 minutes	..	No <i>B. typhosus</i>	} But plates very crowded with other organisms so that <i>B. typhosus</i> may have been outgrown.
10 "	..	" "	
20 "	..	" "	

Chlorine—

Control	..	<i>B. typhosus</i> recovered.	
15 minutes	..	No <i>B. typhosus</i>	} Plates very crowded with other organisms.
30 "	..	" "	
45 "	..	" "	
			.. Few organisms on this plate.

Bleaching Lime—

Control	..	<i>B. typhosus</i> recovered.	} Plates all very crowded with other organisms.
10 minutes	..	No <i>B. typhosus</i> recovered	
20	"	" " "	
30	"	" " "	

The water was tested with starch and iodine for the presence of free chlorine in tubs "B" and "C" at the end of three-quarters of an hour.

Free chlorine was present in tub "B" (chlorine water). No free chlorine in tub "C" (bleaching water).

In this experiment chlorine water gave the best result, but as before the bleaching lime was weak in available chlorine. In no case, however, was complete sterility of the water attained.

Experiment 5.—Tap water was contaminated with *B. typhosus* 1,000,000,000 as it was thought that this organism might have been outgrown by other organisms present in foul stream water. The same technique was used. Result:—

Iodine—

Control	..	<i>B. typhosus</i> recovered.	} Great reduction in all plates, particularly in that after five minutes' contact.
5 minutes	..	" " "	
10	"	" " "	
30	"	" " "	

Chlorine—

Control	..	<i>B. typhosus</i> recovered.	} Very few colonies of any sort.
15 minutes	..	No <i>B. typhosus</i> recovered	
30	"	" " "	
45	"	" " "	

Bleaching Lime—

Control	..	<i>B. typhosus</i> not recovered	Outgrown.	} Plates very crowded with various organisms.
10 minutes	..	" recovered	..	
20	"	" " "	..	
30	"	" " "	..	

In this experiment, as in Experiment 2, there appeared to be a tendency for the chemical to kill off the water coliform organisms before it attacked *B. typhosus*.

Experiment 6.—In this the values of chlorine water bleaching lime, containing twenty-nine per cent available chlorine and Nessfield's "tabloids," were compared; 900,000,000 *B. typhosus* (twenty-four hour broth culture) were added to three tubs as before and samples taken after ten, twenty, and thirty minutes.

The *B. typhosus* was outgrown by other organisms in the controls, but was recovered from all three tubs after ten, twenty, and thirty minutes' treatment with the various drugs. There was, however, a marked diminution of lactose fermenters in the twenty-minute bleaching lime plate and the thirty-minute chlorine plate.

Experiment 7.—An endeavour was now made to compare the

value of sedimentation with alum and straining with that of the sterilizing agents used in previous experiments.

A basin was made of ordinary canvas such as is used for deck chairs. This was fitted to the mouth of a waterproof bag with nozzles inserted at the bottom of the bag.

Two and a half gallons of tap water, to which 600,000,000 *B. typhosus* and twelve grains of alumino-ferric were added, were passed through the sedimenting basin into the waterproof bag. The strained water was drawn off into a clean vessel; twenty cubic centimetres of water before and after straining were planted in glucose bile salt neutral red broth, and Conradi plates made as before.

A good deal of alum came through, causing a precipitate in the glucose medium. Result:—

Control. Colonies too numerous to count. *B. typhosus* outgrown. After straining a very few small colonies. No *B. typhosus*.

Experiment 8.—A time experiment to find how long ordinary water with little matter in suspension took to strain when alumino ferric was added in the proportion of six grains per gallon, and what degree of purification was attained. Three and a half gallons of water came through clear in fifteen minutes. On planting twenty cubic centimetres in glucose broth and plating after twenty-four hours' incubation a drop on Conradi medium, the only difference appeared to be that lactose fermenters were somewhat diminished. After straining, the difference was not very marked.

Experiment 9.—The same test repeated with a grossly contaminated stream water after rain. Four gallons were clarified in thirty-five minutes and the lactose fermenters were again diminished by straining.

Experiment 10.—Two and a half gallons of tap water were contaminated with 1,600,000,000 *B. typhosus* (twenty-four hour broth culture), six grains per gallon of alumino ferric were added, the water strained as before, and Nessfield's "tabloids" were added, the iodine being neutralized with sodium hyposulphite after ten minutes. Two series of culture were made:—

(a) 20 c.c. of water were added to 5 c.c. of 5 per cent glucose B. S. broth; (b) 10 c.c. water added to 5 c.c. of 2 per cent peptone (neutral to litmus) to which 0.2 c.c. 1 in 10,000 brilliant green had been added to inhibit the growth of all but typhoid organisms.

A Control: Before sedimenting .. Abundant lactose fermenters, no *B. typhosus*.

After sedimenting and addition
of Nessfield's "tabloids" ..

A few cocci and moulds.

B Brilliant Green Control .. Abundant lactose fermenters, no *B. typhosus*.

After sedimenting and addition
of Nessfield's "tabloids" ..

A few small colonies (not tested), no *B. typhosus*.

In this experiment the combination of sedimentation and Nessfield's "tabloids" removed all coliform organisms.

Experiment 11.—One gallon tap water in three tins, A, B, C, 1,460,000,000 *B. typhosus* to each. To "A" tin chlorine 1 in 500,000; to "B" tin Nessfield's "tabloids"; to "C" tin bleaching lime according to Nasmyth and Graham's technique.

Cultures in glucose broth and Conradi as before after fifteen, thirty, and forty-five minutes' contact from "A" tin, after ten minutes' contact from "B" tin, after ten, twenty, and thirty minutes' contact from "C" tin. Result:—

Chlorine—

Control	..	..	..	<i>B. typhosus</i> recovered.
15 minutes	..	..	..	" "
30	"	..	..	" "
45	"	..	..	" not recovered.

Nessfield.—*B. typhosus* not recovered, even from control, but plates very crowded with other organisms.

Bleaching Lime—

Control	..	..	..	<i>B. typhosus</i> recovered.
10, 20, 30 minutes	..	..	..	No <i>B. typhosus</i> , but plates very crowded so possibly outgrown.

Experiment 12.—The last experiment was repeated, using *B. dysenteriae* Flexner; 1,400,000,000 bacilli were added to each of four tins; chlorine, bleaching lime, Nessfield's "tabloids," and tincture of iodine were used as sterilizing agents. After varying intervals twenty cubic centimetres of water were withdrawn from each tin and planted in glucose broth, Conradi plates were made after incubation and subcultures from the glucose broth were also made in peptone water to which 0.2 c.c. of a 1 in 10,000 solution of brilliant green had been added with a view to inhibiting all organisms but the dysentery bacillus. Conradi plates were also made from these tubes after twenty-four hours' incubation. The results were as follows:—

Chlorine—

Control	..	..	..	<i>B. dysenteriae</i> isolated, crowded with other organisms.
15 minutes	..	..	..	No <i>B. dysenteriae</i> , fairly crowded with other organisms.
30	"	..	..	" " plate crowded.
45	"	..	..	" " " "

Bleaching Lime—

Control	..	..	..	<i>B. dysenteriae</i> numerous.
10 minutes	..	..	..	" isolated, many other organisms.
20	"	..	..	No <i>B. dysenteriae</i> , plate crowded.
30	"	..	..	" " " "

Nessfield's "Tabloids"—

Control	..	..	..	Very crowded with other organisms, no <i>B. dysenteriae</i> isolated.
After 10 minutes' contact..				Plate almost sterile.

Tincture of Iodine.—Control very crowded. No *B. dysenteriae* isolated. After twenty minutes, *B. dysenteriae* isolated.

The tins to which chlorine and bleaching lime were added both showed free chlorine by the starch and iodine test after forty-five and thirty minutes respectively.

Experiment 13.—To one gallon of tap water in each of four tins, A, B, C, D, 2,000,000,000 cholera vibrios were added. Chlorine, Nessfield's "tabloids," bleaching lime, and tincture of iodine were used, and after varying times of contact 20 c.c. of water were added from each tin to 5 c.c. five per cent alkaline peptone water. After forty-eight hours' incubation subcultures were made on to modified Dieudonné medium plates and the peptone water tested for cholera red by the sulphuric acid test and also by para-diamido-benzaldehyde and potassium sulphate. Cholera was not recovered from any Dieudonné plate, all of which were sterile except for a few moulds, but the peptone water gave the following results:—

Chlorine—			Sulphuric acid		Benzaldehyde	
Control ..	..	..	+	..	..	+
15 minutes	..	..	Faint +	..	..	+
30 „ ..	..	..	„ +	..	..	+
45 „ ..	..	..	Negative	..	..	Negative
Bleaching Lime—						
Control ..	..	..	+	..	..	+
10 minutes	..	..	Faint +	..	..	+
20 „ ..	..	..	„ +	..	..	+
30 „ ..	..	..	—	..	..	—
Nessfield's "Tabloids"—						
Control ..	..	..	+	..	..	+
10 minutes	..	..	—	..	..	—
Tincture of Iodine—						
Control ..	..	..	+	..	..	+
10 minutes	..	..	+	..	..	+

Experiment 14.—Water from a grossly contaminated stream after heavy rain was sedimented through a canvas strainer in which thirty grains of alumino-ferric had been placed. Eight gallons came through in one and a half hours. The water was quite clear (figures being read through a column sixteen inches deep) though previous to straining it was very muddy and opaque. Four gallons of water were placed in each of two Service pakhals. Chlorine was added to one and bleaching lime to the other in the same proportions as in previous experiments. The pakhals were then loaded on a mule and dispatched to the laboratory. They arrived in fifteen minutes; twenty cubic centimetres from each was inoculated into glucose broth, and 0.1 c.c. of this plated after twenty-four hours' incubation. No lactose fermenters were recovered from either plate,

but numerous cocci and moulds were recovered from both plates.

0.1 c.c. of the water was also plated before and after sedimenting. Before sedimenting the count was 660 per cubic centimetre; after sedimenting the count was 120 per cubic centimetre.

Experiment 15. — The last experiment was repeated using fifteen grains of alumino ferric and Nessfield's "tabloids" and tincture of iodine.

The water was cultured and plated as before on reaching the laboratory in twenty minutes. Both waters showed free iodine and had a distinct taste, showing that No. 3 Nessfield's "tabloids" had not been left sufficiently long in contact. No lactose fermenters were recovered from either tin.

The results yielded by these experiments varied considerably, but, broadly speaking, those yielded by Nessfield's "tabloids" were best; and those by Treherne and Nelson's chlorine the next best. Bleaching lime, when a good sample can be obtained, is efficient; but in this country it is difficult to obtain the drug with sufficient available chlorine, and if exposed to the air it rapidly deteriorates. On the other hand, I consider that chlorine, bleaching lime, and Nessfield's "tabloids" may all be relied on to render a water reasonably safe when combined with preliminary sedimentation with alumino-ferric or alum. Alumino-ferric precipitates rather more rapidly than alum. In no case did I effect absolute sterility as has been found by other observers, but it must be remembered that the tests were severe, the contamination being heavy and the quantity of water cultured large.

The case may, in my opinion, be reasonably stated as follows: In the halogen group of elements we have valuable aids towards rendering impure water safe, but their action varies greatly under different conditions, and they should not be regarded as substitutes for boiling when this procedure is feasible.

My best thanks are due to F. C. Burnham, Esq., C.I.E., F.C.S., for supplying me with alumino ferric and bleaching lime, and for testing for the available chlorine in the latter. Also to Major A. W. Sampey, R.A.M.C.; Assistant Surgeons V. J. Lopez, H. J. C. Flanagan, and C. H. Marchant, for much help in carrying out the technique of the experiments.

REFERENCES.

- HILL. *Engineering Record*, 1911, p. 491.
NASMYTH GRAHAM. *JOURNAL OF THE ROYAL ARMY MEDICAL CORPS*, vol. xvii, No. 1, July, 1911.
NESSFIELD. *JOURNAL OF THE ROYAL ARMY MEDICAL CORPS*, 1912.
CLEMESH. "Examinations of Indian Water Supplies."

CASES OF NERVOUS AND MENTAL SHOCK OBSERVED IN THE BASE HOSPITALS IN FRANCE.

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CASES of nervous and mental shock may be counted among the more interesting and uncommon clinical products of the present war. Cases of this character began to arrive in England shortly after the commencement of hostilities in which British troops were engaged, and have continued to be met with in our base hospitals at home with varying degrees of frequency up till the present time. It was soon recognized that one type of case was due to the explosion of big shells in the immediate vicinity of the patient, who did not himself receive any detectable physical injury or bodily wound. Intermingled with the cases of this nature, cases of a general neurasthenic character were found whose symptoms were attributable to exhaustion of the nervous system induced by physical strain, sleeplessness, and other stressful conditions associated with the campaign.

It has been my privilege to study the early symptoms of nervous and mental shock, from whatever cause, during a period of three months at the base hospitals in France. I have thought, therefore, that it would be of general interest if a short account were given of the various clinical manifestations of nervous shock observed in patients upon admission to these hospitals, before they were transferred to the special institutions at home, which have been provided for their reception and subsequent treatment.

In a general way the frequency of these "shock" cases depends upon the intensity and character of the fighting at the Front. The severe fighting in Flanders and around Ypres in the latter part of October resulted in a large number of such cases being sent down to the Base. The numbers of the cases subsequently diminished, and during the earlier months of this year were relatively small with occasional accessions, the outcome of such engagements as took place on January 25 and 26, and March 10 to 12. One of the features of the early fighting was the heavy shelling to which our troops were subjected, and which to a large extent accounted for the prevalence of nervous shock at that time. In addition to the "shock" cases, as such, other forms of functional nervous and mental disorders were observed and studied. These cases are of

general interest as showing the effects of "wear and tear" upon the nervous system under the conditions of the present campaign.

If one studies the cases of nervous and mental shock, it will be seen that the symptoms are widely distributed throughout the nervous system. In a first group, there is a definite type of mental shock in which the symptoms are essentially of a psychical character. In a second group, there is a spinal type characterized by a limitation of the symptoms to the extremities, and usually to the lower limbs. In a third group, the symptoms are referred more particularly to the special senses. In this class remarkable cases of blindness or amblyopia, deafness and deaf-mutism have been included. More specialized symptoms, such as stammering or hesitation of speech, local palsies and tick-like movements, have been included in a fourth group.

It should be borne in mind, that whatever the special symptoms may be, the patients have been subjected in most instances to prolonged and often serious general nervous strain.

PSYCHICAL SHOCK—MENTAL STUPOR.

From time to time cases are sent down from the casualty clearing stations in a state of mental stupor. Some of these cases are unaccompanied by any history or statement which would throw light upon the cause or method of onset of the symptoms. Other cases of a similar, though less profound type of stupor, on recovery from the acuter phases, are able to give some account of the nature of the psychical shock through which they have passed.

The symptoms exhibited by these cases of stupor are interesting and create a clinical picture of a striking character. In the more severe class of case, the patient is entirely unconscious of his surroundings. All the usual tests applied with the object of arresting attention, such as throwing a bright light on to the eyes, pinching the skin, or clapping the hands close to the ears, fail to provoke a response. The deep reflexes, however, are normal or brisk, and the plantar response is of the flexor type. The pupillary light reflex is frequently impaired or lost. Urine is passed normally; swallowing is carried out usually without difficulty.

In some cases the patient would appear to be living again through an experience of the past, probably associated with the time of onset of the symptoms. In a very striking instance, the patient lay curled up under the bedclothes. From time to time he would look out, as if peering over the parapet of a trench, stare wildly around him, and then hide under the clothes. These actions were often repeated and lasted for several days with gradually

diminishing frequency. In another case of a somewhat similar character, the patient would suddenly start and sit up in bed and look around him, crying out, "He's gone, he's gone." It was subsequently ascertained that this patient's brother had been killed when fighting beside him in the trench. Many of these cases present a scared or startled appearance. When approached they shrink and hide under the bedclothes. Others are dull, lethargic, and apathetic, taking no interest in what is going on around them.

A closer examination reveals a marked degree of rigidity of the limbs in most of the cases. As a rule, all the extremities are affected; the thighs are tightly flexed upon the abdomen and the fingers clenched in the hands. In one case there was a decided tendency to catatonic rigidity. In another case of genuine shock the rigidity had a hemiplegic distribution affecting the left arm and leg. In this case the deep reflexes upon the left side were exaggerated and the plantar response abolished.

In the milder type of case the stupor is less profound. These patients may carry out simple actions, such as putting out the tongue when requested to do so, but in a slow, apathetic, and hesitating way. They present a dazed appearance, are readily startled when spoken to, and take little or no notice of what is going on around them. Even in the slightest cases some rigidity of the limbs may be detected, which gradually passes off as the mental condition improves.

A consideration of these cases shows that the patient is probably in a state comparable to what is observed in the "hysterical stupor" or hypnoidal state of civil practice. The evidence would seem to show that he is living through some past experience of a terrifying kind. When information has been obtained upon the possible cause or origin of the symptoms it has been found to be of a psychical character, such as seeing a friend or relative killed by his side.

On the other hand, there were cases of a severe type in which no history was obtained. It is permissible to assume that they may have resulted from shell explosion, or from repeated and continuous shelling. These symptoms are found mainly in young soldiers; in no case has the patient been over twenty-eight years of age, the majority being about twenty-two or twenty-three.

The duration of the stupor varies. In some cases the intensity of the shock has passed off before admission to the base hospital. In those admitted in stupor the symptom persisted for several days and then suddenly passed away, the patient having no recollection

of what had taken place in the interval. In other cases a more gradual recovery ensued, the patient being sent home before complete recovery had taken place. The general outlook for recovery is decidedly favourable. Rest, quiet surroundings, and ample nourishment are the main points of treatment.

LOSS OF MEMORY.

Comparable in many ways to the cases of stupor just described are those cases of loss of memory, or transitory amnesia, which are admitted to the base hospitals for further observation. Prolonged fatigue and exhaustion, coupled with continuous shelling, seem to be the primary causes of these mental breakdowns. The history furnishes evidence that the patient had been found wandering and was unable to give a satisfactory account of his movements. On inquiry of the patient himself, as to what had happened to him, one is told that he had been under heavy shelling for a time just previous to his "losing consciousness," as he says. One such patient said that in the stress of the engagement he had "lost his head" and became unconscious.

The loss of memory may extend over a period of several days. The patient has no knowledge or recollection of what had happened to him during this interval. Attempts to bring back the memory by suggesting possible events or circumstances have not met with success. In one patient, however, the memory was partly restored by a striking association. When lying in hospital he saw a number of men being prepared for inoculation against enteric fever. This recalled to his mind that he himself had been inoculated a few days before the loss of memory came on. From this clue he was able to give some account of himself, although his memory for a period of three or four days had not returned by the time he was sent home. Attempts to recall the memory by the use of "word associations" were not tried.

In addition to the loss of memory the patients complain of headache, and sometimes of a feeling of strangeness and discomfort in the head; the head, they say, is muddled. Sleep is disturbed at first. The reflexes are normal, although the pupillary light reflex may be impaired. Recovery takes place satisfactorily with rest in bed and ample feeding.

DEAFNESS AND DEAF-MUTISM.

Deafness of a transient character is not an uncommon symptom resulting from the explosion of big shells in close proximity to the patient. In addition to the deafness the effects of the explosion are a

stunning or dazing of the mental faculties and sometimes temporary loss of consciousness. In other cases the patient is "blown away" or forcibly precipitated on to the ground by the violence of the explosion. On recovery from these immediate effects the patient discovers that he is deaf in either one or both ears. If all cases are eliminated in which the tympanic membrane has been ruptured, or in which signs of previous or old-standing middle-ear disease were observed, a number of cases remains in which an examination reveals a nervous type of deafness. The watch may not be heard except on contact, and Rinné's test is positive; in one-sided cases submitted to Weber's test, the tuning fork is lateralized to the hearing ear. This form of deafness is not of long duration. It may pass away in a few hours or at most in a few days. The general symptoms of neurasthenia may persist for a longer period.

Deaf-mutism is another effect of the explosion of big shells and provides one of the clinical surprises of the war. In all the cases observed this cause was given by the patient in explanation of his symptoms, although in one case the patient appears to have been buried as well. As the patient is able to write an account of the incidents which led to the onset of his symptoms, the following statements are given as characteristic of all the cases: "We had been in the trenches for thirty-two hours and we were being shelled. The front of the trench was blown down in three places. One shell exploded right over my head and buried me. I do not remember anything until about a quarter of an hour later, when I found I could not speak or hear, and I was shaking all over. In about twenty-eight hours my hearing came back, but I have not been able to speak since." Another patient wrote: "I was coming out of a ditch to go to the store for ammunition when a shell burst right over my head and knocked me down. When I recovered consciousness I was lying in a reserve trench occupied by some of our men, two of whom had come along the ditch and found me lying there. One of them spoke to me and it was then that I discovered that I could not hear or speak." The examination of the sense of hearing reveals deafness of the nervous type. The distance at which the watch can be heard is either *nil* or very greatly reduced, and the Rinné reactions are positive. Should the ears not be equally affected the tuning fork when placed on the forehead is lateralized to the better ear. Tinnitus, giddiness, and staggering gait are not present. I have never observed nystagmus. The mutism may be complete, though in less profound cases the patient

may speak in a whispered voice. Attempts at phonation may be accompanied by movements of the lips and facial muscles.

In the early stages deaf-mutism may be accompanied by general symptoms of shock, such as headache, tremors, twitching movements of the limbs, and insomnia. In the later stages it is the only symptom present, the patients being frequently bright and very sensitive of their disabilities. The deep reflexes are normal, but I have found the palatal reflex abolished and the plantar responses often difficult to elicit. The cases of deaf-mutism would appear to be more persistent than those of simple deafness. One case which was examined three weeks after the onset was still completely deaf and dumb.

BLINDNESS AND IMPAIRMENT OF VISION.

In comparison with the cases of deaf-mutism just described, blindness, or impairment of vision, following the explosion of shells is relatively infrequent. There would appear to be two types of case in which blindness is complained of in consequence of shell explosions. In the first class quite a number of soldiers suffering from the symptoms of a general mild neurasthenia following prolonged fatigue complain of being blind.

An examination of these cases shows that they are not really blind, but are suffering from photophobia and tonic spasm of the eyelids (blepharospasm). Further investigation into the origin of the symptoms reveals that at the time of the explosion sand, dust, or mud was blown into the eyes and has given rise to conjunctivitis, hypersensitiveness to light, and spasm of the eyelids. Recovery takes place quickly under suitable local applications and rest.

In the second class the patients suffer from a temporary blindness or impairment of vision. In the cases of this character which were examined, consciousness was stated to have been abolished temporarily at the outset. In addition to the loss of vision the eyeballs are tender to pressure in the early stages. The pupillary light reflex is normal. An ophthalmoscopic examination shows no structural change in the media, retina, or optic discs. In one case in which the blindness was unilateral, an associated partial ptosis of the upper lid on the same side was present. In another case the examination revealed a large patch of opaque nerve fibres. In a third case Colonel Lister found a slight peripheral contraction of the visual fields. Most cases show some error of refraction. Recovery is said to be complete eventually, although I have myself not been able to observe a case sufficiently long to ascertain the duration of visual impairment.

STAMMERING.

Hesitation of speech has been observed in several cases in consequence of shell explosions. As in the previous cases of shock, the impediment may or may not be preceded by a temporary loss of consciousness. The onset of the symptoms is favoured by previous conditions of fatigue, sleeplessness, and exposure. Most of the patients were suffering from an associated neurasthenia. The symptom itself corresponds in every way with that seen in civil life. The organs and muscles of articulation are of normal character and development, but co-ordination in their movements is defective. The outlook for recovery is good, although the symptom may persist for several weeks.

LOCAL PALSIES AND SPASMS.

These cases are not common and the symptoms are confined to the eyelids. Those examined have been ptosis and spasm of the orbicularis palpebrarum. The ptosis may be unilateral or bilateral, and present all the features of a functional palsy. The spasm is associated usually with local irritation and conjunctivitis. There was one case of "blinking tic" seen in consultation with Colonel Lister. The case was not a true one of nervous shock, as the symptoms had commenced when the patient was at his work before joining the Army. The onset was attributed to some chips of iron being forced into his eyes. A fall upon his forehead when on service had greatly increased the blinking.

SPINAL SHOCK—PARAPLEGIA.

The outstanding symptom of spinal shock is loss of power in the legs. This is brought about by shell or mine explosion in the immediate vicinity of the patient, with or without an accompanying burial of the patient in the trench or resulting débris. It has been found also as a result of a fall, the patient being knocked over and striking his pack against the wall or parapet of the trench and injuring his back indirectly in this way.

In a characteristic case the symptoms and signs are somewhat as follows: The paralysis comes on suddenly, the onset being accompanied by a temporary stunning or dazing of the mental faculties. In other cases temporary loss of consciousness follows the shock and on recovery from this the patient finds that he is unable to move his legs. In those cases which have been buried with or without an associated loss of consciousness, the paraplegia is discovered as soon as the patient is dug out. There may or may not be a transient retention of urine. If it is present it lasts for

about twenty-four hours and requires the use of the catheter; this retention is succeeded by a difficulty in passing urine for two or three days. An examination of the legs reveals a more or less complete motor paralysis, the muscle in some cases showing a slight degree of spasticity or hypertonus. The deep reflexes are either brisk or of normal intensity. The plantar responses are in all cases of the flexor type, although one or both may be lost or impaired if the case is seen in a very early stage. The abdominal reflexes usually are present. An examination of the sensory functions reveals a complete or partial sensory loss both to painful and tactile sensibilities of the "stocking" type. The joint sense of the feet and toes may or may not be impaired. An examination of the back fails to show outward or visible evidence of bruising or injury. Percussion of the spinal column may be accompanied by some degree of localized tenderness, and the patient experiences difficulty in turning in bed owing to the pain or discomfort which accompanies this movement. In this class of case the outlook for recovery is good, movements begin to return in the legs within a short period, and the patient is able to walk about in three or four weeks or less.

There would appear, however, to be a graver type of paraplegia in which the symptoms suggest an organic disturbance of the spinal cord or its nerve roots. Dr. T. R. Elliott¹ has described cases of transient paraplegia following shell explosions, especially in those who have been buried in the trench. The symptoms of this form are complete paralysis of the legs characterized by a lowering of the muscle tone or hypotonus, and a depressed state of the reflexes. There is generally a band of hyperalgesia at the upper limit of the area of numbness, and the spine is acutely tender over a localized area. The sphincters are rarely affected except in the severer forms. The plantar reflexes never show an extensor response.

Taking into consideration the fact that the cause and method of onset is similar in both types of case, the relatively slight clinical differences scarcely warrant the assumption that the first type of paraplegia is "functional" and the second organic. Moreover, it is clear that the men who have been buried under a mass of clay or who have received a definite injury to the lower dorsal or lumbar portion of the vertebral column have been submitted to a local trauma of the spine which the shell explosion cases have escaped. In the only case of Dr. Elliott's, in which subsequent

¹ *Brit. Med. Journ.*, December, 1914, p. 1005.

examination was made, it was noted that the spinal cord was normal, although the muscles of the back were bruised and infiltrated with blood as far down as the sacral spines. It is conceivable therefore that the slight difference in symptomatology may merely indicate a different degree of general and of spinal shock. The duration of the symptoms in the latter type is stated to be longer than in the former, but the outlook for recovery is good, the patient being able to walk about within a few weeks.

Although the legs bear the brunt of the shock, paralysis is not invariably confined to the lower extremities. Cases were observed in which one or both arms may be similarly affected, although to a less degree, and others have been seen in which deafness or even impairment of vision have been accompaniments of the paraplegia.

NEURASTHENIA.

The cases of neurasthenia which are met with in the base hospitals resemble in essential features those seen in civil practice. A common history, as given by the patient, is that after he has been abroad for several weeks or months, he begins to sleep badly, loses appetite and feels "run down." Often the breakdown goes no further, and a short rest relieves the symptoms and the patient is able to return to duty. On the other hand, to these symptoms may be added feelings that he is incapable of doing his duty properly, he loses confidence in himself, and begins to worry about his health. In more severe cases the patient loses weight and complains of flatulence, constipation and dyspeptic symptoms.

In this type of case the cause is found usually in the exacting conditions under which the patient is living. In many instances he may persevere with his work, until a severe psychical shock, such as seeing one of his friends killed beside him, severe shelling, an upsetting experience, or bad news from home, unsteadies him and precipitates a definite attack of neurasthenia requiring rest and treatment at home.

An inquiry into the history of these cases will reveal usually either a previous attack of neurasthenia or occasional sleeplessness.

On the other hand, there is observed a form of temporary "nervous breakdown" scarcely justifying the name of neurasthenia, which would seem to be characteristic of the present war. This occurs in those who have been strong and well and is ascribed to a sudden or alarming psychical cause, such as witnessing a ghastly sight or undergoing a harassing experience. As the result of such a shock the patient becomes "nervy," unduly emotional and shaky, and, most typical of all, his sleep is disturbed by bad dreams. The

dreams are of experiences through which he has passed, of shells bursting, of duels between aeroplanes, or of the many harassing sights of the war in the trenches. Even the waking hours may be distressful from the acute recollection of these events revolving in his memory. Headache, slight mental depression and fine tremor may be accompaniments of these symptoms. There is usually an entire absence of objective signs; the deep reflexes are normal, the pupils respond to light, the tongue is clean and the pulse of normal frequency. Recovery is satisfactory, especially if the patient is sent home for a complete rest.

Various modifications of the usual type of neurasthenia as just described are observed. For example, there is a type characterized by *anxiety* as the main feature. This may take the form of fear or apprehension as to his ability to do his duty, or fear of being left alone, or of having made a serious mistake in his work. In one case the patient conceived the idea that he was unable to hold his rifle. Should the anxiety be concentrated upon his health the patient develops symptoms of a definitely *hypochondriacal* character.

Other cases again are accompanied by excessive *motor agitation*, in which tremulousness of the face, tongue and limbs is associated with a nervous and agitated manner. Cases of generalized tremor are found also, although they are less common and more persistent than the types already described. In the cases of this sort which were examined the tremor was mainly in the head and neck, although the limbs did not entirely escape.

Passing from the comparatively simple types of neurasthenia, we meet next with those of a more aggravated kind. *Acute insomnia* may be included under this heading. This symptom would seem to be more common in those whose duty confines them to an office, especially where responsibility weighs heavily upon the individual. It has been found also in consequence of prolonged strain and continuous shelling. Other forms assume a more depressed character and merge into *melancholia*. Other aggravated forms have the features of the *exhaustion psychoses* and develop symptoms of mental confusion and maniacal excitement.

In conclusion, it may be stated, that a form of neurasthenic breakdown may be found in cases admitted for medical disorders, especially of the gastro-intestinal tract, such as gastritis, enteritis, and colitis. It happens occasionally also, that patients suffering from surgical wounds of the head show acute neurasthenic or psychical symptoms which may persist after the wound has healed; these cases do not come within the scope of this paper.

Royal Army Medical Corps, Rouen Medical Society.

THE fifth ordinary meeting of the Society was held at No. 11 Stationary Hospital, Rouen, on Saturday, March 13, at 3 p.m., Colonel B. Skinner, A.D.M.S., Rouen, occupying the chair.

The Honorary Secretary reported that inquiries had been instituted with regard to renting rooms for the accommodation of the Society, but that the buildings so far investigated were quite unsuitable, both as regards rent and accommodation. It was resolved, therefore, that the Society shall meet at No. 11 Stationary Hospital until further notice.

SANITATION IN WAR.¹

By MAJOR R. B. AINSWORTH.

Royal Army Medical Corps.

THE sanitary officer is merely a very small link in a very large chain of defence, and without the assistance of every officer in the R.A.M.C. our whole line of defence against preventive disease breaks down, and breaks down hopelessly. I propose to deal with my subject under three distinct headings, viz. :—

(1) The condition of affairs from a sanitary point of view under which our Army is serving now.

(2) The conditions you may have to tackle should our sanitary precautions fail.

(3) Our line of attack—because to defend you must attack.

My work is rendered very difficult by the fact that whilst many of you have as much experience of sanitation in the field as myself, there are, unfortunately, many more of you who have had no previous experience at all of this subject, and it is to these officers that my remarks are mainly directed to-day.

This is the first campaign in which sanitary officers and sanitary sections have been employed with the British Army in the field, and it is exceedingly gratifying to be able to state, after the first six months of the War, that we have not been found wanting, and that these appointments are not only essential, but that as our Army grew it has been necessary to considerably increase our sanitary staff, and from a personnel of half a dozen sanitary officers and two sanitary sections that we started with in August we have more than doubled the number of sanitary officers, and found it necessary to appoint a sanitary section to every

¹ Paper read at meeting of the Rouen Medical Society, March 13, 1915.

division in the field, in addition to employing at least one at each base and camp of concentration; but the creation of sanitary officers and sanitary sections has by no means solved the problem of prevention of disease in an army, it has in a way created fresh difficulties, for as soon as a sanitary officer appears in a district a large proportion of military medical officers consider that their duties in connexion with sanitation are finished—so please, gentlemen, get that idea out of your head. Sanitary officers are there to help you over your difficulties, to advise you on those rare occasions when you require advice, and by means of their chief—the A.D.M.S.—to bring pressure to bear on other departments when you find it difficult or impossible to get defects remedied or improvements carried out. Every officer of the R.A.M.C. is (or at least should be) a sanitary officer in his own unit; he is the sanitary adviser to his chief, the officer commanding the troops. He is there to help him with well-considered advice on all matters concerning the health and welfare of the troops of which he is for the time being in medical charge, and he should do even less crabbing than the special sanitary officer does, because it is only very young and very inexperienced sanitary officers who have that unpleasant habit. Now, gentlemen, let us consider for a moment the conditions under which our Army is serving from a sanitary point of view, and in connexion with these conditions are you, all of you, doing your share to prevent the occurrence of infectious disease? You must realize that it is impossible for me to give you definite figures to support my statements, but you can take it from me that we have here a very large number of troops, and a large floating military population with daily influxes from two infected centres—namely, the British Isles and the Front. Then we have an enormous civil population—a population of over 125,000, amongst which most of the infectious diseases are endemic, and the health of which is seriously menaced by the introduction of our military population—the French military sick and wounded, and a large number of refugees. In addition to this a considerable portion of our military population here is actually billeted in the town, and there is free intermingling with the civil population. We have for our water supply two available sources, the best of which is, to put it kindly, not above suspicion, and a climate which combines sufficient sun and moisture in the summer to form an ideal breeding-ground for flies. I think you will agree that it is unnecessary for me to go any further (and perhaps hurt other people's feelings), but can you picture a more ideal situation for the development of almost every known form of epidemic disease?

These remarks apply with very little modification to all the bases our Army is occupying, and with even greater force to our troops at the Front, but I am unable to speak from first-hand knowledge of the latter. Now what are the conditions you may have to deal with should our sanitary precautions fail? The future reputation of our Corps depends on the success we attain in the campaign against preventive disease.

I think you will allow that the conditions under which our Army is fighting, the sanitation of the country in which they are fighting, and the climate of that country, are all far more suited to the development of epidemic disease than was ever the case during the South African War, and if we fail—that is, if all our sanitary measures fail—what will be the result? In the South African War we had over 100,000 cases of enteric fever, simple continued fever, and dysentery to deal with, during a war of approximately two and a half years' duration; now with double the army that ever was put in the field there, we have had only just over 500 cases of enteric fever (625 to be correct) in the first six months of this War; a little simple calculation will show you that if conditions approximating to those of South Africa during the first six months of this War had prevailed, we should have had from 20,000 to 30,000 of these cases to deal with. The figures are really higher, but I prefer to take the lowest possible as I am unable to give you the exact figures.

With the Army we now have in the field a big epidemic will upset, aye even break down the whole of the medical arrangements. I doubt very much if your splendidly equipped and well-organized hospitals could stand the pressure; the staff cut down by sickness and by our having to hastily improvise new hospitals, hospital clothing and beds failing, the laundries unable to cope with the work, and then as a reward for all your work—the end of all things—a Royal Commission.

You probably think I take too gloomy a view of the possibilities of the future. I appeal to those of you who served in South Africa, particularly in Bloemfontein, during the epidemic of enteric there, to support me: and remember, with regard to inoculation against enteric fever, that by inoculation we only raise the protective power of the individual against that disease; he is not immune, as you all know, and with sufficient doses of the infecting agent, the protection obtained will be overcome.

Our line of attack may be summed up under two headings, attention to details and unity of action: only by attention to every detail, whether it be in hospital, camp, or in billet, can we hope to obtain any measure of success. Dirt breeds disease, which may be translated into dirt breeds flies and flies breed disease.

Sanitation is the science of preserving health, and you as medical men know that health is preserved by attention to the thousand details of life, details of clothing, of food, and of ventilation. It is not necessary for me to mention all these items in detail, and I do not propose to do so, but would beg of you officers who are in medical charge of troops here and elsewhere to devote a very considerable proportion of your day's work to the sanitation of those camps, and remember that your duties are not confined to the examination of drafts and attending to the morning sick.

Go round your camp at least twice a day, visit the kitchens, the

latrines, the dining-rooms, see to the men's tents and attend to every detail in that camp; remember that attention to clothing and food is a very important part of your duties, equally so the removal of refuse and what are described as waste products.

Having by now, I hope, convinced you that I am not here with malicious intent, may I mention a few of the sanitary defects that I have noticed.

Investigation into a few recent cases of enteric fever has shown me that in spite of two recently published orders, unboiled milk is a common article of diet in several units, and watercress is quite popular. A well constructed grease trap is supposed to fulfil two purposes: to arrest the grease and to be inaccessible to flies; I have seen several which fulfil neither of these purposes. How many officers in medical charge of camps here realize that the civilian appendages to those camps—the Y.M.C.A. and other allied institutions—are also under your charge, and how many of you personally satisfy yourselves that the drinking water supply to your camp and unit is sterilized?

It is most extraordinary how divergent are the results obtained in the burning of excreta in different units; in some it appears that the wind is always in the wrong direction.

And lastly, with regard to anti-typhoid inoculation, I know of a medical unit in which only fifty per cent of its personnel has undergone this very necessary protective procedure.

These are only a few instances which show lack of attention to detail, and I thought perhaps they might interest you. If you ask me for further advice I would concentrate your attention on the following.

Make it a point that every officer and man serving in the same unit with yourself is inoculated against enteric fever. Regard every case of infectious disease that occurs in your unit as a possible cause of a large epidemic and take every precaution immediately on its occurrence; do not wait for advice on the subject.

Take it for granted in war that all water supplies are contaminated and should be sterilized; you have a very simple and very efficacious method at your hand in chlorinated lime, get acquainted with the details and see that those serving under you do the same.

Regard the presence of the common house fly as a danger signal, the greatest danger signal to an army in the field. Make it your chief duty to locate and remove any possible fly breeding source in the neighbourhood of your camp or hospital. The fly has been aptly described as the filthiest creature on God's earth. Born and bred in faecal matter it spends its existence alternately visiting the latrines and kitchens.

Musca domestica, or the house fly, has learnt from natural instinct that heat and moisture are essential for the development of her progeny, and this she knows is most easily obtainable in the numerous varieties of excreta and there she lays her eggs; these after twenty-four hours

develop into larvæ and then into pupæ, from which finally the fully grown house fly emerges after a total period of generally ten to twenty-one days, the duration of the whole process varying considerably and depending mainly upon heat and moisture. As a fly breeding material any variety of excreta is suitable, whether it derives its origin from a horse, a cow, a pig, a dog, a chicken, or a human being, and it is only when these sources are wanting that the female fly betakes herself to the fermenting refuse heap to deposit her eggs.

Now let us consider for a minute the various methods by which a fly may carry infection.

Firstly, direct conveyance by the fly alighting on infected excreta and returning to an article of diet. Secondly, infection by means of flies born and bred in infected material, that is to say, flies which have spent their larval and pupal stages in infected material and have had to depend on that material for their only available source of food supply. And lastly, infection by means of the crop. The fly leads a very precarious existence, and not having been provided by nature with teeth has to depend upon other methods for tackling solid articles of diet, and so it is essential for her to first of all seek out some form of liquid with which to fill the crop; this being accomplished, she later alights on some solid and appetizing article of food and proceeds to feed on this by means of regurgitating the contents of her crop; and, provided she is not disturbed, leisurely proceeds to repeat this several times and finally takes back as much as she can. If you consider the many and varied visits that this insect has paid during the day and that the process of swallowing and regurgitation is continually taking place, you can well imagine the highly infected state of articles of diet exposed to the visits of hundreds, perhaps thousands, of flies.

Whether we shall ever be able to entirely limit the breeding of house flies is a matter of doubt, but I can assure you of this, that we can entirely prevent the breeding of those flies which chiefly concern us, we can by making our latrines obnoxious to flies greatly lessen the prevalence of these insects there, and by incineration of excreta we entirely prevent the breeding of these insects in what may be highly infected material.

I have not gone further into this subject, for I understand that my colleague, Captain Marett, will deal more fully with preventive measures.

What do I mean by unity of action? We progress in sanitation chiefly by education, a slow and laborious process, which had, however, attained a high level in the British Expeditionary Force as it existed last August; now we are dealing with a new Army and it is up to us to inculcate the laws of health among those new men at every possible opportunity.

I suppose no man in the British Army meets with more opposition than the sanitary officer, new ideas are never popular, and particularly so with old soldiers, and before any progress can be made it is necessary

to convince whoever may be in command of that particular unit that one's suggestions are not only sound but absolutely necessary; it is in this matter that I ask for your loyal assistance.

I do not wish you to subordinate your views to mine, and am only too ready to discuss any suggestions with you, but once having committed ourselves to a certain policy let us unite loyally and give it every support. Quite recently in trying to get anti-enteric inoculation carried out in a certain unit I met an officer of the R.A.M.C. who was opposed to this procedure as a preventive measure against enteric fever. There are no doubt several of you who do not agree with me that more enteric fever has been spread by flies than has been caused by water, and there are many of you who still believe that it is impossible to burn human excreta in camp, though the number is already less than it was a short time back. I spend half my day, frequently in vain, trying to convince distinguished combatant officers that various sanitary procedures are not only practicable but essential: one will not believe that the urine will soak away in the subsoil, another will not drain his camp for fear of setting free the virulent organisms contained in that subsoil, a third tells me my incinerator is wrongly built and a fourth that you cannot burn excreta in it—and when he is proved to be wrong, tells me the smell will be so bad that they will have to vacate the camp. That is why I ask for your help and for unity of action; if you are not convinced yourself, study the question in dispute, discuss it with me if you like, but once having been convinced of its practicability and necessity then go like myself and preach the gospel of hygiene. In conclusion you will probably say what have I brought to your notice that you did not know before? I hope nothing, for if you have already grasped the seriousness of the subject, and have made up your mind to tackle it, then my work is accomplished. Attention to detail, unity of action, loyalty to ourselves.

Two great duties are asked of the R.A.M.C. in war time. To evacuate the sick and wounded as quickly as possible and to see that the Army is physically fit to fight. To attain this end no detail is too small, if we fail in that we fail entirely, and all the skill and ability of the surgeon and other distinguished men will not put the R.A.M.C. together again.

SANITATION IN WAR.

By CAPTAIN P. J. MARETT.

Royal Army Medical Corps.

THE subject is too big to deal with here in its entirety, and therefore on taking up one branch of sanitation it is hoped that in choosing the subject of prevention of infections, an important one, one may raise sufficient material for discussion. Unluckily for medical officers, military conditions are not helpful for the prevention of infection and for segregation. If it were possible to segregate each unit, then disease would not spread, but up at the Front, where unit after unit occupies the same trenches, spread of infection from unit to unit must occur.

Even with regard to such different arms of the Service as cavalry and infantry, intimate contact occurs, owing to the former taking their turn in the trenches; again, with our White and our Indian troops contact, and close contact, at the Front is inevitable. At the base, things are only slightly different, for we get a mixing up of our cavalry and certain infantry units. In each of our cavalry camps we have infantry units attached, in the one R.A.M.C. in the other R.E.; besides this we have an enormous number of horses in the remounts close to us, and they will be nothing but a danger.

Again another source of infection of formations is due to the constant to and fro movement of men. We have B details and convalescents joining from the Front, we have men coming down on various duties, and from England we are constantly receiving reinforcements, and these from camps and places of which we know nothing. Segregation here again fails us; we could hardly divide up each base camp into three portions, as would be necessary to carry out proper segregation, for then the military point of view would fail, as segregation has to be carried out for some definite period. This period, in an endeavour to take in all infectious diseases, would require to be one of three weeks, which would probably suffice, except for mumps and a few cases of enteric.

Again, another source of infection exists in the civil inhabitants. Here we have to differentiate between troops in camps and troops in billets, where the latter are bound to come more or less in contact with the civil population. In camps this danger is hard to do away with, for we have various civil institutions—the Y.M.C.A., the cinemas, the shooting galleries, and last but not least, the various tuck shops and farms which abound on the edges of the camps and over which we have no jurisdiction, and in which uncooked foods and unauthorized drinks are available. Now that we have roughly reviewed our rampart against disease and see the many points where it fails, we have to see what safeguards can be taken to deal with and prevent the spread of infectious disease in our midst.

Drafts on arrival in camp are inspected. This is the first barrier ; at this inspection the prior movements of the men should be ascertained, and thus a knowledge gained of conditions whence the men have come. Each infantry base has a definite number of units, and as successive lots of reinforcements arrive, their prior conditions will be known by the past history of previous reinforcing drafts. When a man reports sick one of the most important points to elicit is the length of time that he has been in camp ; and invariably treat with suspicion the man who has come down from the Front, as there conditions are the most unfavourable. So when a case is suspected of being infectious it should be treated as suspect, and in this stage all necessary disinfections and segregation should be carried out.

All the above can be grouped under the heading of Protection of Man from Man.

Men have to be protected further, and this protection naturally falls into four groups :—

- (1) Preventive inoculations.
- (2) Protection by personal cleanliness and by periodic disinfections of blankets and clothing, &c.
- (3) By general cleanliness of camps.
- (4) By providing a treated supply of drinking water.

Preventive inoculations are used against enteric, and by raising the immunity of the individual we assist enormously in the protection given.

Overcrowding in camps simply means accumulation of dirt. Apart from this, disease may occur in a camp presumably full of healthy individuals, and may be due to the individual known as a "carrier." Here the term carrier will be extended to include animals and insects.

The chief carrier diseases with which we have to deal are the intestinal infections, chief among which are enteric and the paratyphoids.

With reference to these, according to season, so does the important factor, the carrier, vary. In winter, where the carrier is man, we have few carriers ; it is our duty to search out all those who may be likely carriers, and after examination get rid of such as are detected. It is of the utmost importance, therefore, to see that no man is employed in the handling of food-stuffs who has at any time suffered from an infectious intestinal disease. All such men are barred. The staff of men employed on food-stuffs should be permanent, and should be examined to see if by any chance they may have suffered from a disease of this class without being aware of the fact, that is, the excretion of all such men should be examined. This in itself is not an easy matter, but the officers entrusted with these examinations have worked hard and rely on medical officers in charge of camps and billets to send for examination any men who may be taken on as cooks, dining-room orderlies, or messmen.

With the advent of summer the carrier will change. There must be men in every camp who, at some time, have suffered from enteric or allied

disease, and have become carriers; if their excreta be exposed to insects, such as flies, which have faeces for a breeding-ground, the flies will become infected and act as carriers by their habit of passing from faecal matters to food-stuffs.

Here, then, where the general movements are known, all flies have to be taken as carriers, and one must do one's utmost (1) to prevent fly breeding; (2) to kill all flies when found; and (3) to protect one's food-stuffs, latrines and infected patients.

(a) PREVENTION OF BREEDING OF THE HOUSE FLY.

All fermenting organic matter is suitable for fly breeding. Instinct has provided the fly with the habit of depositing her eggs in decaying substances which contain heat and moisture, and a manure heap is the best example of a fly breeding-ground, for once manure is well infected the total weight of the different instars or stages will weigh over one-third of the weight of the manure, and the number of flies the progeny of one female during a season amounts to millions and is inconceivable. Major Ainsworth has referred to the length of life of the different instars of the house fly and how they vary according to temperature. Here in Rouen the manure problem is a big one, for during the rainy season both carting and burning to any extent gave poor results; the resulting accumulation can be gauged when one knows that the daily output of horse dung is roughly a hundred tons.

The disposal of manure therefore is an enormous problem. If it were possible to sell this manure then no doubt it would be sold and so got rid of, but when there is a lack of transport and a paucity of farm labour the monetary value of the manure depreciates.

The manure is being dealt with in three ways:—

(1) Heaps are made of old manure, these are dusted with quicklime, covered with earth, and planted with hay dust and other seeds; the result will be mounds of grass.

(2) *Burning*.—As much manure is burned daily as is possible; presently incinerators will be built, which will greatly assist in the burning.

(3) *Dumping*.—A narrow-gauge train line has been laid to a natural depression, and here the manure is being dumped and will be covered with quicklime, earthed, and then planted over.

The above represents the work that is being done with reference to manure disposal; if any fresh manure cannot be tackled during the day, it will have to be sprayed over with paraffin, or with bleaching powder solution.

At the same time it must not be lost sight of that the house fly will breed in any collection of decaying organic matter.

(b) KILLING OF FLIES.

(1) By mechanical means—at night flies will shelter in buildings and tents; buildings such as hut camps can be sprayed with paraffin, tents

should be struck at reveillé, taking care to keep them closed, when the contained flies can be killed by rolling up the tents and keeping them rolled up till after the midday meal, when they can be once more pitched.

(2) *Fly Traps*.—These are of various kinds, but probably the best are those which are designed on an intimate knowledge of the habits of the fly. A fly requires water, and for the reason that it is unable to eat solids is restricted to a fluid diet, owing to its mouth parts consisting of a suction and not of a masticating apparatus. Every bit of food that a fly takes has to be dissolved in fluid, and a fly will invariably fill up with water prior to eating, its internal economy being so arranged that the fluid taken in is received into one organ, the proventriculum, from which it is pumped to and fro until saturation is complete, when it passes the fluid into its stomach; the practical application of this is that the normal house fly when it is not defecating is vomiting, and each fly speck may be contaminated with pathogenic organisms.

Now with this knowledge of the absolute necessity for fluids, the best trap is that of a five per cent. solution of formalin in a plate to which lumps of sugar are added; a stronger solution will be left untouched owing to its smell.

(c) PROTECTION OF FOODSTUFFS.

Dining-huts and cook-houses should be fly-proofed; this has been asked for, then all foodstuffs will be kept under cover and protected. The foodstuffs that require special attention are jam, butter, cheese and bread, all good media for bacterial growth. Even when fly-proofing is carried out, it is a good plan never to eat anything cold which can be eaten hot.

(d) PROTECTION OF LATRINES.

Here in latrines, as elsewhere, the great mucifuge is paraffin. The interior of buckets should be rubbed round with paraffin, the under surface of the latrine seats should be coated with the same substance, and the ground round sprinkled with paraffin from a watering can.

(e) INFECTED PATIENTS.

In tented hospitals which cannot be fly-proofed, the use of mosquito curtains is essential, otherwise flies will settle on a semi-conscious or unconscious patient's open mouth.

Passing now to the paratyphoids, these have shown an increase in incidence. In the last 100 cases of enteric group, typhoid accounts for 70, *Bacillus paratyphosus* B for 24, and *B. paratyphosus* A for 6 cases. These diseases have been spread by human carriers.

Other Infectious Diseases.—Scarlet fever, measles, cerebro-spinal meningitis, mumps, etc.

SCARLET FEVER.

In the civil population we have scarlet fever; the disease is conveyed by contact and by milk. Base Standing Orders and Routine Orders both refer to the prohibition of fresh milk in camps, yet little heed is paid to those orders by medical officers in charge of camps and less by units themselves.

MEASLES.

Here again we have a disease which is occurring amongst the civil population, but the cases which are cropping up are contact cases, and the only means of prevention are diagnosis in the early stage, i.e., coryza, with search for Koplik's spots, and insisting on strict segregation. That segregation is not properly carried out can be gathered from the fact that a man, isolated in one of the camps, with a sentry over the tent, was accidentally killed in the town of Rouen.

CEREBRO-SPINAL MENINGITIS.

This disease appears to have been imported. An epidemic occurred in the north of France about a year ago, and cases have also occurred amongst the civil population. The disease is spread by human carriers, the specific micro-organism being harboured in the nasal secretions. Isolation of contacts is essential, especially contacts of cases which have shown marked coryza in the initial stages. All such contacts have to be segregated until such time as their nasal secretions can be examined bacteriologically for the specific germ and a negative report rendered.

MUMPS.

This disease has been practically confined to our native troops, amongst whom it is prevalent; this is probably due to Eastern habits of hawking and spitting promiscuously, coupled with customs of food preparation in close proximity to fouled ground, as well as to a habit of eating out of a common dish.

TYPHUS FEVER.

With the prevalence of the body louse one must refer to the possibility of an outbreak of typhus fever. For this to occur one must have infected lice, and a careful investigation of the health statistics for the north of France for the last few years showed one case which occurred in 1913 at a village outside Havre. Our duty as regards the diminution of lice is not lessened by the above facts. Men coming into camp should be inspected, and when found infected should be treated.

Inspection for body louse: The most heavily infected part is the crutch, but as it is inconvenient to make a man strip, it is generally sufficient to examine shirts. These should be turned inside out, each side seam and the collar band, especially the surplus fold at the back of the neck, should be inspected for eggs, and the man's body examined for bites.

Treatment is both preventive and curative. All men should use the paraffin which is allowed for this purpose, which is both a preventive and curative measure. At present men suffering from lice are sent to hospital, and where one man in a tent is found infected, all the other occupants of the tent should be examined. When the disinfectors for camps and billets are finally built, each man will undergo the following treatment: He will undress in one room, hand his infected clothing and blankets through a window to the disinfecting room (foul side); he will then take a bath, and when this is finished he will pass into another room, where he will find his disinfected clothing. In billets the flat iron has been used with excellent results. Where clothes can be boiled, boiling in salt solution is satisfactory. The eggs are fragile, as they are operculated.

In conclusion may I say that when a case of infectious disease is diagnosed, the one course of action is to proclaim all the facts to those concerned, so that preventive measures may be carried out. Lessen by every means the number of carriers—human by the methods in existence, insect by carrying out all recommendations for their diminution. Where orders exist let us all carry them out with good will, and let us remember that ignorance of an order is no excuse. I apologize for having taken up your valuable time over simple facts, but as I have stated orders must be obeyed.

Lieutenant-Colonel McNAUGHT, discussing Major Ainsworth's and Captain Marett's papers, said that these officers had not claimed nearly enough for what the Sanitary Department had done during the past months, with a staff quite inadequate for the purpose. He congratulated them heartily upon the results that they had achieved. A great deal of the success was due probably to the fact that in the present campaign the sanitary officers and sections had much greater power than was the case in South Africa. The new Armies will bring many new problems, and a very great responsibility rested upon the sanitary officers concerned.

A point that the speakers had raised was the question of civilian appendages to camp and units. Colonel McNaught urged inspection of all such bodies, religious and otherwise. Frequently these organizations were left to take care of themselves, a source of considerable danger to all who came into contact with them. He remembered an instance in South Africa where two fatal cases of dysentery were traced directly to the civilian organizations in connexion with camps.

Referring to the question of prophylactic inoculation against typhoid fever, the speaker thought that much depended upon dealing with the matter at once in each unit, before the men could be prejudiced against the value of the measure by certain of their companions.

As regards sanitation at the actual Front, we have so far undoubtedly had great luck. This good fortune cannot be expected to persist

unless the most stringent measures are enforced and obeyed by all concerned.

Captain TATE observed that as an ex-sanitary officer and one who had seen the work at the Front, he was very interested in Major Ainsworth's and Captain Marett's papers. He referred to the extreme importance of dealing effectually with the clothing and equipment of men who have contracted typhoid fever. In Lahore he had had a striking example of this. An outbreak of enteric occurred in a cavalry regiment, and in spite of all precautions cases still kept appearing, in spite of all regulations. It was discovered eventually that the infection persisted in the clothes of the attendants upon the first cases in the epidemic. At any rate, whether *post hoc* or *propter hoc* no fresh cases occurred when the kits had been thoroughly disinfected.

One of the speakers had referred to the importance of flies in the conveyance of typhoid infection. Some years ago Captain Tate had conducted experiments to ascertain the true value of this statement. Flies were fed upon infected material and six days later typhoid bacilli were recovered from them. Referring to his experience at the Front, the speaker observed that in September, on the Aisne, flies occurred in myriads. It was really providential that no outbreak of enteric fever then occurred, inasmuch as "carriers" must have been present. In a village adjoining where he was stationed the most appalling insanitary conditions prevailed. However, an incinerator was eventually established and the whole village thoroughly cleared in spite of the attentions of German "snipers." To keep flies away from latrines he advised that the floors be composed of a solid mixture of sand, petroleum and tar. He had seen latrines so constructed and no flies ever occurred in their neighbourhood.

Colonel B. SKINNER said that for the last fifteen years the policy of the Army had been to strike at the root of this matter by educating each individual. With regard to the question of sanitation, combatant officers had been instructed and it was their duty to instruct the men under their charge. The result was that when the present Army started its campaign no army was better equipped in knowledge of sanitary science affecting the field. These men, however, had now been expended. In fact not more than about half were left. What would happen, therefore, with the new Army now arriving in France? Matters were on an entirely different footing. The officers, indeed, had in most instances had no training at all in sanitation. The result must inevitably be a large increase in the amount of disease, unless the Medical Service came to the rescue. The medical officer alone could save this Army from the epidemics that threaten it. Information must be spread broadcast by all concerned, and unity of action is most important at the present time. In matters of sanitation well established lines must be adopted and carried through. Diverse opinions and controversial discussions at the

moment should be "taboo." It is only in this way that the lay mind can be defeated. Superstition in the lay mind is a very strong factor, especially in matters relating to sanitation. The speaker cited particularly the question of aerial-wise infection, and he holds that this has got upon the lay public. Therefore unity both in statement and action of the medical profession is a factor of all importance. A few simple rules, learnt from experience, must be adopted on all sides. It is not the time to be original. In fact in matters of sanitation there is not much scope for originality. The medical officer should work on broad lines and spread his knowledge broadcast.

Referring to the question of prophylactic inoculation against typhoid which had been raised by one speaker, Colonel Skinner advocated immediate action, even if troops were on the move. If it was certain that a regiment was travelling on the morrow then no time should be lost in inoculating the men, even if it involved an inoculation on the eve before the journey. The full dose should be given under such circumstances. He quite agreed with Colonel McNaugh's remarks on this subject. The motto should be "strike at once."



Clinical and other Notes.

HEALTH OF THE GERMAN ARMY—MEDICAL EXPERIENCES.

DISEASES AND CASUALTIES FROM WOUNDS.

(From a Medical Correspondent.)

DURING the first few weeks of the war the publication of German medical journals was much disorganized: some did not appear at all, and others were published in a much attenuated form. Some of these journals have not reappeared, but the leading "weeklies" are again appearing regularly, and are devoting much of their space to the surgical and medical experiences of the war. The information to be gleaned from this source is naturally fragmentary, but when supplemented by the reports sent to medical journals in neutral countries by medical men who have visited the German hospitals, a fairly accurate estimate can be made of the health of the German army.

The war had not lasted many weeks before twenty-five hospitals were improvised in Berlin, with accommodation for half an army corps. Many temporary hospitals were erected in the suburbs, and though only made of wood they proved warm and comfortable, yet were not very costly. In the large base hospitals every precaution was taken to detect infectious diseases as early as possible. The outbreak of plague among wounded Indians was anticipated and greatly feared by the Germans, who suspected pneumonic plague in every case of pneumonia among the Indians. Apart from a serious shortage of gauze and cotton wool, the arrangements for the wounded in the large towns have, on the whole, proved satisfactory; and German surgeons with experience of the war of 1870 were loud in their praise of the improved conditions which motor ambulances have effected.

CONDITIONS AT THE FRONT.

Admirable as was the organization of the large base hospitals, the transport of the wounded from the fighting line seems to have been very badly managed during the rapid advance of the Germans through Belgium and the north of France. The supply of motor ambulances proved totally inadequate, and the slightly wounded had to shift for themselves and to squeeze into goods trains which had brought men, horses and ammunition to the front. The conditions under which the sick and wounded were herded together without food, adequate clothing, or attendance seems to have been appalling; and patients suffering from dysentery, typhoid fever, and wounds were indiscriminately packed together in railway trucks, which were constantly being shunted for the

benefit of able-bodied combatants on their way to the front. The state of these patients after several days of such travelling is said to have been almost indescribable.

On both fronts the Germans have had to cope with numerous outbreaks of typhoid fever. These outbreaks are alleged by the Germans to be partly due to the fact that the war is being waged in foreign territory where the disease has not been as effectually controlled in times of peace as in Germany. This excuse is somewhat lame, as typhoid fever is a disease which may become widespread even on virgin soil, provided precautions are not at once taken to stamp out an epidemic in its early stages. No figures are yet available, but there is considerable evidence to show that the Germans have suffered much more from this disease than we or the French. During the first stages of the war the Germans had adopted no uniform system of inoculation; and they seem to have used many different makes of vaccine, and to have followed different methods of administration. It is not, therefore, surprising to find a lack of unanimity among German medical men as to the effectiveness of inoculation. They do not, indeed, condemn it, but while some are ardent advocates, others are exceedingly lukewarm in their praise.

LOCKJAW.

So far tetanus has been the greatest bugbear to the German surgeon, and Professor Czerny has stated that among 60,000 wounded Bavarians 420 developed tetanus and 240 died of this disease. (In the military hospitals of Strassburg, fourteen per cent of all the deaths were due to tetanus. It is believed that the great frequency of tetanus in this war is due to the trench fighting in heavily-manured districts, where the infected soil often remains in contact with a wound for hours and even days before antiseptics can be applied. The fact, too, that the lacerated wounds caused by shell and shrapnel are relatively more common in this war than the wounds caused by rifle bullets may also partly explain the greater frequency of tetanus. The Germans have experimented extensively with anti-tetanic serum, but they are not convinced as to its merits. Some silly accusations have been made in the German medical press by surgeons who have noticed a greater frequency of tetanus among their own men than among the French, and who have accordingly declared that French bullets must have been intentionally infected.

Dysentery has appeared in the German army in Lorraine, and during the latter months of 1914 it gave the medical authorities considerable trouble. Much difficulty was experienced in limiting the epidemic, for the symptoms were often so slight that the disease was not detected in many cases till several days after its onset. The suspension of the importation of ipecacuanha from Brazil has been a cause of great anxiety in Germany, as the supplies of this drug, which is invaluable in dysentery, are admitted to be small. In this connexion

it may be added that the supply of opium and its derivatives was also said to be insufficient at the beginning of the war, as the export of this group of drugs from neutral countries was prohibited.

CASUALTIES FROM WOUNDS.

All surgeons agree that the casualties are much more numerous from shell and shrapnel than from rifle fire, and that this difference is greater than it has been in other wars. But at present it is impossible to give an accurate estimate of the percentage of complete and partial recoveries from wounds, for the severity of the wounds decreases the further a hospital is from the firing line. In other words, the proportion of serious cases in a hospital in Lille is far greater than in a hospital in Heidelberg or Berlin, and until the statistics of all the hospitals are compared no reliable judgment can be given on this subject. It is, however, safe to say that, owing to the relative frequency of shell and shrapnel wounds, the casualties in this war are on the whole more severe than they have been in the past.

In spite of the many difficulties with which the German army surgeons have had to cope, they seem on the whole to have done their work well and to have maintained a fairly high standard of health. The material with which they have had to work has often been poor, and the physique of the new recruits is reported to be unsatisfactory. Indeed, only sixty-three per cent of the men who volunteered are said to have been fit for active service. But the need for men has been so great that the subjects of rupture and varicose veins have been accepted for part-time military service. There is no dearth of medical men in the services, but the efficiency of the Army Medical Corps has been obtained at the cost of the civilian population. Many country districts in Germany have been robbed of all medical aid.—From the *Manchester Guardian*.

SEVERE CASE OF INTRACTABLE SYPHILIS SATIS- FACTORILY TREATED WITH HECTINE.

By MAJOR E. G. FFRENCH, M.D., F.R.C.S.E.

Royal Army Medical Corps.

AND

LIEUTENANT C. H. MILLS, M.R.C.S., L.R.C.P.

Royal Army Medical Corps.

PRIVATE T. W. W., aged 30, was admitted to the Military Hospital, Rochester Row, London, S.W., on September 19, 1914, suffering from a large perforation of the hard palate. He was placed on the syphilis register after giving the following history:—

HISTORY OF CASE.

Patient, a reservist, has been engaged as a fish porter in Billingsgate Market for the past seven years. He admits to having been a very

heavy beer drinker. On November, 1910, he developed a hard chancre on the penis. He did not seek medical advice, however, until after the chancre had been present for three weeks. He then consulted a civilian doctor who commenced a course of mercurial treatment comprising pills and medicine by the mouth. This he continued for six months. Three weeks later, having abandoned his treatment, a rash appeared on the trunk, arms and legs, which he describes as dry and scaly. He then went to a large general hospital when scabies was diagnosed, and the patient was given sulphur ointment supplemented by sulphur vapour baths, and the rash gradually disappeared. In 1913 (two years ago) a "lump" appeared in the centre of the hard palate. He attended the Mildmay Mission Hospital, when he was again given mercurial pills and mouth wash. He continued his work, however, for four months, and the condition seemed to improve. The gumma, however, for such it was, did not discharge, nor was the surface broken. Eight months later (approximately one year ago) the gumma again commenced to increase in size. This he reported to the Mildmay Mission Hospital. It had now broken down, and was discharging profusely. Mercurial treatment was resumed, but the ulcer progressively got worse for a period of six months. An operation was now suggested for the removal of the necrosed bone. At this date, however, he was called up to the colours as a reservist, and after completing one month's service (including three weeks in France) he was sent to the Rochester Row Military Hospital for treatment.

CONDITION ON ADMISSION.

General Appearance.—Patient was in a flabby, unhealthy condition, presenting an oval perforation of the hard palate roughly the size of a shilling, through which was extruding a foul yellow discharge, and his breath was very foul. No external gummatous changes elsewhere about the body, nervous system unaffected, as evidenced by normal reflexes. Weight 12 st. 4½ lb. No albumin, and no signs of hepatic cirrhosis, heart and chest normal.

TREATMENT.

A combined course of salvarsan intravenously, accompanied by mercurial injections intramuscularly, was decided upon. Accordingly he was given three intravenous injections of 0.9 gramme neosalvarsan, administered at intervals of a fortnight, accompanied by ten weekly injections of 1 grain mercurial cream, during which course his weight dropped to 11 st. 3 lb. Patient was now put on pot. iodid. 7 grains three times a day and daily inunctions of ung. hydrarg. 1 dram. The pot. iodid. was gradually increased until 15 grains four times a day was tolerated without any ill effects. The discharge through the perforation, however, was so foul that the patient had to be isolated. The perfora-

tion gradually increased in size—this three months after admission to hospital. The following necrosed pieces of bone were removed during this period at intervals: the whole of the vomer, the perpendicular plate of the ethmoid, and the palatal process of both the palate and the superior maxilla. Wassermann reaction positive. At this stage it was deemed advisable to administer an injection of 0.6 gramme of the original salvarsan which was tolerated without any reaction, pot. iodid. now 20 grains four times daily accompanied by daily mercurial inunctions being continued. For about ten days the destructive processes appeared to be no longer progressive. The patient now developed alarming attacks of vomiting, and so a diet consisting of small quantities of milk at short intervals was resorted to. The lower lid of the right eye became very œdematous, accompanied by almost alarming protrusion of the palpebral conjunctiva. It was considered possible that the patient was being overtreated, and a rest of two weeks was ordered, during which time, however, the œdema if anything, became more marked. No exophthalmos. Vision in that eye was rendered impossible, unless the lids were separated. The sight then, however, was found to be normal. The lachrymal duct was occluded, and bony crackling could be demonstrated when pressure was made over the right lachrymal bone, in which region a discharging sinus appeared. The first molar tooth on the right side was extracted from the upper jaw, and the antrum, which now possessed no inner wall, thoroughly irrigated. Necrosed bone was at the same time removed, comprising the outer wall of the alveolar process and part of the malar bone—thus opening up the antrum external to the alveolar process. A leech was applied to the œdematous lower lid, followed by fomentations for six hours, which reduced the swelling very satisfactorily.

At this stage it was decided to try a course of hectine injections with which the French syphilologists had claimed such good results. Accordingly, ten subcutaneous injections, 0.2 gramme, were given. The first three on alternative days, followed by seven daily injections. His condition commenced to improve almost at once, and the vomiting ceased. The discharge became less and appetite improved. Nobody was more impressed than the patient himself, who at this period had become very despondent. In the first week his weight increased seven pounds, and at the end of the course of ten injections the patient was allowed to sit up.

Encouraged by the very satisfactory results of this first course of ten injections a second course was commenced on March 11, 1915, comprising ten daily subcutaneous injections of 0.2 gramme hectine in the buttock. During this course he increased in weight by $7\frac{1}{2}$ lb. After a fortnight's rest, a third course, also comprising ten daily subcutaneous injections, was administered, during which he increased exactly 5 lb. The gross gain in weight from prior to the hectine courses is indicated by the increase from a minimum of 10 st. $\frac{3}{4}$ lb. up to 12 st. 8 lb., i.e., 2 st. $7\frac{1}{4}$ lb.

PRESENT CONDITION.

As can be surmised from the increase in weight the general condition of the patient now is extremely satisfactory. His appetite is normal, and he takes his daily exercise round the Hospital quadrangle, and he is anxious to resume general duties. The huge cavity resulting from the total destruction of the structures comprising the nasal fossæ is lined with healthy granulations. There is a bridge of healthy gum separating the orifice external to the alveolar process and the perforation of the hard



palate. There is now no discharge coming down into the mouth, and the sinus over the right lachrymal bone is healthy. It is considered wise to keep the patient on a modified course of pot. iodid. and mercurial inunction. The case is interesting in that it clearly proves that we have, apart from the already accepted specifics comprising mercury, pot. iodid., salvarsan, neosalvarsan, kharsivan, and now neokharsivan, and the French arseno benzol, "yet another valuable string to our bow." In this case we have not the least doubt that, but for the employment of hectine, this patient's chance of ever becoming an efficient soldier, or, in fact, of ever recovering, his decline in weight and general condition being so rapid, was very poor. It was a matter of daily anxiety as to how much further the processes would go without involving the meninges.

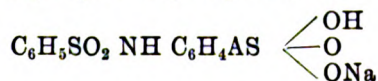
This is undoubtedly unique in our experience of the most severe cases of syphilis treated at this hospital, in that no improvement resulted when subjected to the above described intensified combination of accepted specifics. Regarding the patient's future service in the Army, he is merely waiting now for the general structures of the buccal cavity to have settled down sufficiently to warrant the fitting of a dental obturator. Encouraged by the above, we have used hectine in other cases, and hope to publish more notes on the subject before long, and discuss its relative value with the results we are obtaining with kharsivan and neokharsivan,



which drugs we are now giving an exhaustive trial in approximately one hundred cases.

HECTINE.

Sodii benzo-sulpho-p-aminophenyl arsonas.



Description.—Hectine consists of colourless needles, very soluble in water, containing approximately twenty-one per cent of arsenic.

The preparation used is put up in sterile ampoules containing twenty centigrammes in one cubic centimetre.

Hitherto we have employed hectine purely locally, e.g., injecting into the neighbourhood of a chancre, gumma, etc., with good results clinically.

The photographs hardly convey a satisfactory impression as to how serious the condition had become.

(a) Being taken at the end of the first course of ten injections of hectine.

(b) A month after the termination of the third course of same.

SOME GENERAL NOTES ON SUFFOCATION BY POISONOUS GASES WITH DETAILED NOTES ON ONE FATAL CASE.

BY LIEUTENANT A. W. HENDRY AND LIEUTENANT E. L. HORSBURGH.

Royal Army Medical Corps.

DURING the last two weeks we have had under our care in this hospital several cases of suffocation by poisonous gases. We have attempted to divide them into clinical groups according to the severity of the symptoms and physical signs.

GROUP 1.—THE MILD CASES.

Class A.—In these the cough was frequent, painful and harsh; the physical signs in the chest were rough breathing with sonorous rhonchi indicating an essentially "dry" condition of the chest, suggesting a reddened and roughened bronchial apparatus.

Class B.—The cough was frequent and painful in these cases, but the harshness was not so apparent; the sounds in the chest were moist, and there was some secretion of a greenish, viscid character which was expectorated by the patient.

In both these classes of Group 1 the patients complained of headache, pain in the eyes and abdominal pain, but they were not cyanotic and the symptoms tended to disappear rapidly, with the exception of some increased frequency of respiration, which persisted for days and had not entirely subsided upon their discharge to convalescent camp.

GROUP 2.—THE MODERATELY SEVERE CASES.

These patients were actually ill. They were cyanotic with frequent panting and painful respiration which caused them the greatest discomfort. Headache was very marked, and pyrexia up to about 100° F. was common for three or four days. The physical signs varied in different parts of the chest. In the upper part the sounds were loud with sibilant rhonchi. Lower down, especially at the back, there were sub-mucous râles, indicating a "bronchiolitis." Such patients were usually drowsy, and tended to get much worse at night.

GROUP 3.—THE VERY SEVERE CASES.

The only case of this group which came under our care, and of which we propose to give some detailed notes, together with the post-mortem findings, exhibited signs of extreme poisoning which led to a fatal result. He was admitted in a semi-comatose condition twenty-four hours after being exposed to the fumes. He was intensely cyanotic, respiration rate 30 to the minute, pulse 88, throat dry and red, tongue cracked and furred.

When roused, which could be done with great difficulty, the patient indicated by signs that he had severe pain in the chest. He was unable to cough, and there was much rattling with the breathing. Physical signs showed râles all over the chest, front and back. The fremitus of these râles was easily palpated by the hand. The condition was diagnosed from these signs as acute pulmonary œdema following exposure to irritant fumes. The blood-pressure appeared to be raised though apparatus for verifying this was not at our disposal. Bleeding was resorted to, and twelve ounces of blood were withdrawn from the median basilic vein at the elbow. The intensely dark colour of the blood and its remarkable rapidity of clotting were the special features noted at the operation. The latter condition made the operation very tedious and difficult. The patient seemed to be relieved for a time, but never regained consciousness, and died in twenty-four hours from the time of his admission, and forty-eight hours in all from the time of being exposed to the fumes. Oxygen was administered throughout without any benefit. Postural treatment resulted in large quantities of frothy secretion pouring out of the nose and mouth, but at no time was the patient able to expectorate this for himself.

Post-mortem Findings.—The body was that of a moderately developed adult man. There were no external signs of interest. Rigor mortis was complete two hours after death. Examination of the chest showed very firm old pleuritic adhesions between the left lung and the chest wall. The lungs were fully expanded, crepitant throughout, and floated in water; on section they emitted a very tenacious frothy and slightly blood-stained exudation from all parts of both lungs. A similar exudation was also found filling the tracheæ, bronchi, and bronchioles indicating a condition of general acute pulmonary œdema. Sub-pleural hæmorrhages were also found in various places. The heart showed some hypertrophy of the left ventricle but was otherwise normal. The liver was congested. The left kidney was enlarged and showed two infarcts, one pale, the other red, but the capsule of the kidney stripped easily and there were no signs of nephritis. The right kidney was normal. The spleen was not enlarged nor congested. The other abdominal organs were normal, likewise the brain, which was carefully examined. The urine was normal in colour, acid, specific gravity 1020 and contained no pathological products. Smears taken from the blood, and stained by Leishman's stain showed a remarkable number of cells indistinguishable from myelocytes, and also an increase in the lymphocytic elements of the blood. The polymorphonuclear

leucocytes were diminished to about 30 per cent. The red cells were unaltered. We would wish to call attention to this condition of the blood, and should be glad to hear if such changes have been observed in other cases of a similar kind. As regards treatment this varied according to the group under which the patient was diagnosed. Those of Group 1, Class A., i.e., those with dry physical signs, received a purge and a bronchial sedative.

Those of Group 1, Class B, and Group 2, i.e., those with moist physical signs, received a hypodermic injection of atropine sulphate gr. 1/100, and for a few days were put on a mixture containing belladonna. In two cases emesis was produced with good results. In our one case of Group 3 we found no treatment of any value. Transfusion with normal saline after bleeding might have been done, but in our opinion it was contra-indicated on account of the possibility of increasing the pulmonary œdema. The administration of atropine to this case also occurred to us, but owing to the lungs being already so full and the paralysing effect of the drug on the coughing reflex being recognized, we considered its use inadvisable.

We shall be interested to hear of other investigations carried out on similar cases and especially to know if the findings in these cases agree with ours, also we shall be glad of some suggestions for the treatment of the severe cases.

AN UNUSUAL CASE OF VARIX.

By MAJOR C. E. POLLOCK.

Royal Army Medical Corps.

ONE morning just after reaching hospital I was sent for in a hurry to see an officer whose servant stated that he had ruptured a vein and who requested me to bring a "styptic" and to come at once. On arrival at the officer's quarters I found him lying down compressing the end of his penis with a clean handkerchief. He explained that he had a varicose vein in his penis, which on two previous occasions had ruptured spontaneously and that he therefore knew what to do pending the medical officer's arrival. He stated that the vein had ruptured while he was dressing and about to shave himself. Judging by the state of his pyjamas he had evidently lost several ounces of blood.

On examining the penis I found a fairly large varicose vein which emerged from the glans penis forming a prominent loop over the frænum and continued along the under surface of the penis, disappearing near the commencement of the scrotum. He stated that on the previous day he was wearing a rough bush shirt and had been obliged to do a great deal of walking. He felt the shirt chafing the end of his penis, but thought no more about it after getting in and changing his shirt. The

prominent loop of the vein showed a small abrasion in the centre of which the wall of the vein had ruptured. The hæmorrhage was easily stopped by a gauze dressing and firm bandage under which the wound healed in about a week.

The vein was very superficial throughout its course and appeared to be in the skin, and merely covered by a thick layer of epithelium. As the officer hoped shortly to return to England no operation was attempted in Sierra Leone.

NOTES ON A CASE OF ACUTE EMPHYSEMATOUS GANGRENE OF THE ARM FOLLOWING SHRAPNEL WOUND. AMPUTATION AT THE SHOULDER JOINT. EXTENSION OF GANGRENE TO THE FLAPS. RECOVERY.

BY LIEUTENANT H. L. MARTYN.

Royal Army Medical Corps.

CORPORAL W. K., Royal Field Artillery, was wounded at Ypres by shrapnel on March 15 at 5.30 p.m. He went direct to the dressing station, was dressed within half an hour, spent the night there, was entrained on the afternoon of March 16, and was admitted to No. 12 General Hospital on the afternoon of the 17th. On admission his pulse was 120, and temperature subnormal. There was a very small entrance wound on the inner side of the upper arm at its junction with the outer wall of the axilla over the line of the axillary vessels. The humerus was fractured at the junction of the upper and middle thirds. There was an exit wound, circular, about one inch in diameter, on the outer side of the upper arm at the junction of the lower and middle thirds. Considerable bruising existed over the whole of the upper arm, but with very little swelling except near the exit wound where there was considerable subcutaneous extravasation. The forearm appeared normal, there was no cedema, and the pulse at the wrist was palpable. The only suspicious point on examination was the presence of a few bubbles in the blood squeezed out of the exit wound. The wound was dressed and the patient prepared for operation next day.

By the morning his condition had markedly changed, he was semi-conscious, pale, and breathing quickly, almost with air hunger. The pulse remained 120, but the temperature had risen to 102° F., and there was incontinence of urine and fæces.

Under the anæsthetic the dressing was removed. The entire arm from the level of the exit wound to the tips of the fingers was found to be cold, almost black and very swollen. Pressure anywhere, even to the back of the hand, gave an emphysematous crackle.

In the circumstances amputation was the only alternative. The arm was accordingly removed by disarticulation at the shoulder joint, lateral

flaps being cut which nowhere approached within two inches of the apparently infected tissue. The cut surfaces were swabbed over with one in two thousand solution of perchloride of mercury, and brought together by deep and superficial sutures, a large drainage tube being inserted, on the table, in the lower angle of the wound extending up into the joint. A hypodermic injection of pituitrin was given, and rectal salines and hypodermic injections of one hundredth of a grain of digitalin were given at once and repeated four hourly.

The next morning the patient's condition had greatly improved. The temperature was 98.8° F., pulse 124. He was fully conscious, had full control of fæces and urine, and was breathing normally. He was dressed within twenty hours of the operation. The dressing was soaked with thin very offensive discharge. An area of skin three inches square extending from the lower edge of the anterior flap was black. Large bubbles of offensive gas escaped from the incision on pressure and the whole stump was emphysematous. The stitches from the whole of the lower half of the incision were removed and ten volume solution of hydrogen peroxide injected deeply by means of a long needle and glass syringe, not only into the infected muscles but also through the upper part of the incision into the substance of both flaps. The wound was also packed with gauze soaked in the same solution.

Twelve hours later the wound was again dressed and all the remaining stitches both deep and superficial were removed. The gangrenous area of the skin in the anterior flap was surrounded by bullæ full of gas and serum. The entire inner surface of both flaps when exposed was black, dry and gangrenous. A large amount of gangrenous tissue, including the gangrenous area of skin, the whole of the substance of the deltoid in the anterior flap, a large part in the posterior flap, and parts of the muscular bellies of the coraco-brachialis, biceps and triceps were freely excised. Hydrogen peroxide was again injected deeply, iodoform powder was sprinkled over the wound and the whole packed with gauze soaked in peroxide.

The patient's general condition in spite of the extensive infection of the shoulder muscles, was then, and remained throughout, good. He was pale and very drowsy, but his pulse continued at 120 and his temperature varied between normal and 101° F.

The rectal salines, stimulants of champagne and brandy, and injections of digitalin were continued for some days after the operation. The dressings were repeated twice daily, as much as possible of the gangrenous sloughs being freely excised at each dressing and the injections of peroxide were continued.

Within seven days of the operation well-marked lines of demarkation were visible in the infected fascial and muscle planes. The original thin, offensive, serous discharge was replaced by an inoffensive purulent discharge and freely separating sloughs. Granulation followed with

exceptional rapidity and within twelve days of the operation the wound was entirely covered with healthy granulations and healing rapidly.

I would draw attention, particularly, to the profound, rapidly developing, toxæmia associated with the infection before amputation, as compared with the good condition of the patient after operation, in spite of the very extensive infection of the shoulder muscles. This I think may be attributed to the very free opening up of the wound and the use of the deep intra-muscular injections of peroxide, which undoubtedly limited the spread of infection.

It has been argued that the free removal of infected tissue by the knife from the surface of the infected wound would be liable to open up fresh planes for infection and allow of increased absorption of toxins. This, in cases of infection with an anaerobic organism, appears not to be the case, as by diminishing the chance of anaerobic growth under the mass of dead slough, the opportunity of spread is definitely lessened and the toxæmia derived from the absorption through the freshly cut surfaces is slight compared from that resulting from masses of dead tissue allowed to separate slowly. Further, by the removal at once of obviously infected tissues, more opportunity is given for the free application and injection of hydrogen peroxide.

As to the much discussed value of iodoform, in these cases it certainly appears to be of use, quite apart from the benefit of it to the patient as a deodorizer.

The tendency to flap infection in these cases appears to be very great and I am strongly inclined to suggest the advisability of removing the limb with a reasonable margin above the limit of gangrene without making any attempt to cut flaps, leaving the wound open to be dealt with, and the flaps to be fashioned after all possibility of subsequent spread of infection has passed.

A NOTE ON SOME CASES OF BLOOD INFECTION BY AN ANAEROBIC ORGANISM SECONDARY TO WOUNDS.

BY LIEUTENANT ADRIAN STOKES.
Royal Army Medical Corps.

DURING the months of October, November, December and January, while doing bacteriological work in connexion with the Casualty Clearing Stations, a series of cases in wounded men occurred giving the same clinical and bacteriological picture. The clinical picture was characterized by four separate features; first the colour of the patient, which was a dirty yellow, something like the colour of a dirty deal table; secondly, the very soft running pulse, which was always very rapid, often uncountable and in the later stages irregular; thirdly, uncontrollable vomiting, and fourthly, the very rapid onset of the condition after the

injury. The presence of obvious gangrene at the site of the wound was inconstant, in three of the six cases reported it was present, in the remaining three it was absent. Death occurred in every case with great rapidity, forty-eight hours being the average time, one case survived eighty hours. The patient was always conscious to the end and in a state of "euphoria." It appeared probable from the great similarity of the symptoms and the invariable result in every case that there might be a common cause. The presence of the bacillus of malignant œdema was suggested as the probable explanation; an attempt to isolate the organism from the wounds having failed in two cases, it was thought that it might be found in the blood-stream, and accordingly blood cultures were made in the series of cases reported. In six cases a culture was obtained by this method of an organism which was indistinguishable from the *B. aerogenes capsulatus*. The blood cultures were made in three cases immediately after death from the heart's blood, and in the three remaining cases the blood cultures were ante-mortem. In two cases which died after a week in hospital of typical gas gangrene the culture was negative, in one case ante-mortem and in the other case post-mortem. The former case had been twice operated upon in attempting to stay the spread of the gangrene, in the latter case it was thought that the patient would not stand reamputation; in this case the culture was ante-mortem and gave a positive culture of *Staphylococcus aureus*. These two cases seem to make it probable that the series in which positive cultures of an anaerobic organism were obtained may be a separate and distinct condition. The number of cases in which it was possible to verify the diagnosis of blood infection by culture is small, on the other hand there were no negative cultures in cases which were regarded as typical of the condition.

The six cases in which blood cultures were positive were as follows:—

Name	Number of c.c.	Place	Hours of survival after wound	Time of blood culture	Projectile wound
Pte. W. ..	4	Braisne ..	50	P.M.	Shell: comp. femur.
Pte. R. ..	4	Poperinghe ..	40	"	"
Pte. B. ..	4	Poperinghe ..	60	"	Bullet: "comp. humer.
Major B. ..	4	Lillers ..	48	A.M.	Shell: comp. humer. and femur.
Lieut. C. M.	1	Bethune ..	80	"	Bomb: arm not fract.
Pte. L. ..	4	Lillers ..	40	"	Shell: comp. femur.

The technique adopted was the same in all the cases, shake cultures in glucose agar were made as soon as possible after the blood was taken, at the same time ordinary aerobic blood-plates were made which in every case were negative at the end of forty-eight hours. In the shake cultures bubbles of gas were observed in all the cultures on the next day. In five of the positive cultures gas appeared with great rapidity; in two it was apparent

in six hours and in three it appeared in ten hours. The culture was profuse and the formation of gas abundant, the agar being forced up the top of the tube. Growth ceased within an inch of the surface of the medium and seemed most active about two inches from the surface. The organism was a Gram-positive bacillus, most of the bacilli taking the Gram well, a few individuals losing the stain and a few showing a beaded appearance. The bacilli varied a good deal in length, forms longer than anthrax being common and forms as short as *B. coli* were found. It did not form spores in glucose agar and died out in one week in that medium. In one culture (Major B.) capsules were stained, in the others they were apparently present but it was not possible to stain the actual capsule. The colonies were dense and opaque, and on McLeod's plates made with blood glucose agar they showed a distinct hæmolytic power. The organism is non-motile. It was possible by making use of the hæmolysis to isolate the same microbe from two quite harmless wounds, one in the leg, the second in the thigh. One culture (Major B.) killed a guinea-pig in fifteen hours; the other culture (Lieutenant C. M.), made a pig very ill but it did not die; these were the only cultures injected into animals. There were a large number of cases presenting the same clinical picture in which it was not possible to make blood cultures to verify the diagnosis. From the very rapid onset of the symptoms it is probable that the infection of the blood-stream occurs either at the time of injury or very soon after it.

CARBOLIC ACID DISSOLVED IN PARAFFIN OIL AS A MEANS OF PREVENTING SEPSIS IN GUNSHOT WOUNDS.

BY LIEUTENANT M. K. ACHESON.
Royal Army Medical Corps.

As the result of the publication of Sir W. Watson Cheyne's illuminating oration in the *Lancet* of February 27, on the treatment of wounds in war, some experiments were undertaken at No. 1 General Hospital, on similar lines to those described by him.

Owing to stress of ordinary routine laboratory work, the limits of time, and to active service conditions, the work had to be considerably curtailed.

After going over some of the ground already covered by Sir W. Watson Cheyne, ordinary crude paraffin oil was adopted as being a promising medium for bringing antiseptics in contact with pathogenic micro-organisms. Carbolic acid was dissolved in water-free paraffin in varying percentages. The solution was then tested in reference to its bactericidal effects, its diffusibility, its power of penetration through organic substances, its toxicity, its volatility and its action on the vitality of living tissues and its absorption by them.

Local Bactericidal Action.—This was found to be somewhat similar to that of corresponding strengths of carbolic lotion.

Diffusibility.—A number of similar agar slopes in test tubes of the same diameter were thoroughly inoculated with *B. subtilis*. One cubic centimetre of different strengths of the carbolic and paraffin solution and of various other antiseptics were carefully deposited through fine pipettes at the bottom of the already inoculated agar tubes without touching the agar except at the bottom of the tube. The tubes were incubated in the upright position for twenty-four hours at 37° C. After incubation the distance between the lowest margin of the growth of the bacillus on the agar slopes and the mean level of the antiseptic fluid was measured in millimetres. The results on the average of a number of observations are shown below:—

				Strength	Distance between growth and antiseptic
Hydrarg. perchlor.	..	..	1-2,000	..	No growth.
Tincture iodine	..	..	<i>B.P.</i>	..	"
Hydrogen peroxide	..	..	20 vols.	..	30 mm.
Carbolic and paraffin	..	..	2½ per cent	..	20·6 "
Cresol	..	..	5	..	19·6 "
Carbolic and paraffin	..	..	2	..	17 "
Carbolic lotion	..	..	5	..	16·3 "
Carbolic and paraffin	..	..	1	..	12 "
Cresol	..	..	2	..	12 "
Carbolic olive oil	..	..	2½	..	8·3 "
Carbolic lotion	..	..	2½	..	7·5 "
Boracic lotion saturated	..	..	..	..	1 "
Paraffin oil	..	..	..	..	Slight inhibition.

B. subtilis was employed because of its sporing nature, its rapid growth, readily recognized appearance, and the difficulty generally found in arresting its advance.

Penetration through Organic Substances. — A number of round lids (ordinary tobacco tins, etc.), were obtained. In the centre of each lid a hole was punched about the size of a shilling, over which was placed a circular layer of meat. This meat was about a quarter of an inch thick, free from intermuscular septa, of homogeneous fibre and completely filling the lid. The upper surface of the meat was inoculated with an emulsion of *B. coli communis* and *B. pyocyaneus*. The lid containing inoculated meat was then placed in another lid in such a way that the floor of the upper lid did not come into contact with the floor of the lower lid. Into the lower lid was poured a few cubic centimetres of the solution to be tested. In order to bring the lower uninoculated surface of the meat in contact with the fluid of the lower tin, a pledget of cotton wool was placed in the antiseptic in a position corresponding to the hole of the upper lid. The two lids were then placed in a Petri dish and incubated for forty-eight hours at 37° C.

As this experiment is a very severe test, certain precautions are

necessary. All the specimens of meat should be taken from the same animal and from the same part of the animal if possible. As the meat during inoculation will swell considerably, large Petri dishes should be used to prevent pressure of the glass on the meat surface. The layers of meat should not be more than a quarter of an inch thick.

Various antiseptics were tested and compared with different strengths of the paraffin carbolic solution. It was again found that paraffin itself had no inhibitory action, but that even so weak a solution as the one per cent carbolic paraffin acted as a deodorant and prevented marked decomposition in the meat. It not only penetrated the meat in the centre in the neighbourhood of the point of contact of the solution with the lower surface of the meat, but also crept up around the margins of the meat at the periphery. Broadly speaking the longer the meat was incubated in the presence of the carbolic paraffin, the more marked was the antiseptic effect.

In the case of hydrarg. perchlor. 1 in 1,000, hydrogen peroxide, carbolic paste in lower strengths than ten per cent, carbolic oil two and a half per cent, the meat invariably became so offensive that as far as these substances were concerned the experiment had to be abandoned after thirty-six hours.

As regards tincture of iodine the results were rather interesting. Provided fifteen to twenty cubic centimetres of the tincture were poured into the lower tray, no decomposition occurred in the meat. With lesser quantities the results were not so satisfactory.

Unfortunately it is inadvisable, from the point of view of toxicity, to inject sufficient quantities of iodine into a gunshot wound to prevent sepsis occurring. Iodine must therefore be regarded as a failure in reference to gunshot wounds, simply because it may not be used in sufficient quantities. There is, however, no reason to discard its use in aseptic surgery.

Carbolic lotion and cresol lotion beginning at strengths of 5 per cent were also proved to be of value as penetrating antiseptics and deodorants, though the effects of the carbolic and paraffin were always found to be roughly at least two and a half times as great. That is the action of five per cent solution of cresol or carbolic lotion was about equivalent to that of the two per cent carbolic and paraffin. In the case of carbolic and paraffin solution, as long as the pledget of wool remained moist in the tray beneath the meat, practically no decomposition took place in thin sections of the meat, except when very weak solutions were used. The result of this experiment was striking as the inoculated meat reproduces pretty well the conditions found in a septic wound. Clots or dead tissue might be expected to be penetrated for a considerable distance by the carbolic and paraffin solution if kept continuously present in the wound by means of gauze packing and gauze wicks.

Toxicity.—One cubic centimetre of two per cent carbolic and paraffin

solution was injected subcutaneously into a guinea-pig (three hundred and fifty grammes) without ill effect. No toxic effect was observed as a result of the use of the solution in a number of septic gunshot wounds.

Volatility.—Carbolic lotion incubated 37° C. was found to evaporate about four times as quickly as carbolic and paraffin solution of the same strength.

Injury to the Tissues.—No injury or corrosive effect was observed as a result of the presence of the paraffin solution on raw surfaces. The skin, however, was occasionally blistered.

Absorption by the Tissues.—The characteristic odour of the solution has been noticed emanating from wounds into which it had been injected twenty-four hours previously. Absorption is probably very slow.

Disadvantages.—The inflammable nature of the paraffin should not be dangerous with ordinary precautions. Blistering of the skin is due to the creeping nature of the paraffin, its lack of volatility and the intimate prolonged and continuous contact of the carbolic in the paraffin with the skin.

Conclusions.—The pure carbolic acid which has recently been recommended causes destruction of tissue at the seat of application, and the resulting slough may easily form a nidus for bacterial growth in a wound already devitalized and lacerated.

Carbolic paste in high strengths may prove toxic. It cannot be injected in any satisfactory fashion into a wound and has little or no superiority over much weaker strengths of the carbolic and paraffin solution.

The carbolic and paraffin solution is roughly speaking two and a half times as penetrating, twice as diffusible, equally bactericidal and equally non-toxic, as a corresponding aqueous solution of the drug. In addition it remains moist four times as long as an equal strength of carbolic lotion at blood heat.

It is suggested that all penetrating wounds should, as soon as possible, be injected by means of a glass syringe with a two and a half per cent solution of the paraffin and carbolic, care being taken to protect the skin in the manner described below, and the wound should be then lightly packed with gauze. The plug may be moistened, if necessary, during the train or boat journey to the base hospital.

For prophylaxis the two and a half per cent solution is recommended, for treatment one per cent.

Precautions.—The solutions should be made in bottles which have been carefully dried and the paraffin should be filtered and water-free. A simple way of demonstrating the water impurity in paraffin is to add a crystal of methylene blue, when the water lying at the bottom of the vessel reveals its presence by the absorption of all the stain. It is necessary, however, to test for water before the carbolic is added, as carbolic paraffin is a solvent of methylene blue. This is important as a small

quantity of water in the paraffin assimilates to itself the bulk of the carbolic, and thus a very small amount of water may constitute a very concentrated solution of carbolic acid sufficient to produce local necrosis, and at the same time nullify the essential penetrating effect of the paraffin.

In the experimental treatment of wounds in hospital with a two per cent solution, it was found that blistering of that portion of the epidermis occurred where the superfluous oil overdrained, but it was discovered that if the superficial area exposed to the paraffin were painted with collodion, allowed to dry, and the injection then made, the ill effects were avoided. The results of the treatment in wounds already septic were frequently gratifying.

Speaking from the point of view of a member of the staff of a base hospital, one is struck by the large percentage of wounded who on admission show comparatively little clinical evidence of being seriously ill, but who within the course of a few days develop the most profound degree of toxicity.

The problem arising in this campaign has been to find a suitable medium for introducing the antiseptic and retaining it in continuous contact with the tissues until such time as further surgical attention can be given to the wound.

As a result of bacteriological investigation and clinical experiment in the wards of this hospital, it would seem feasible that paraffin oil should be thus employed until a better medium is found.

COMBINED INCINERATOR AND WATER HEATER.

MAJOR P. MOXEY, M.B., CH.B., D.P.H.

Royal Army Medical Corps (T.F.).

AND

CAPTAIN G. SCOTT-WILLIAMSON, M.B., CH.B.

Royal Army Medical Corps (T.F.).

1/3 South Midland Field Ambulance.

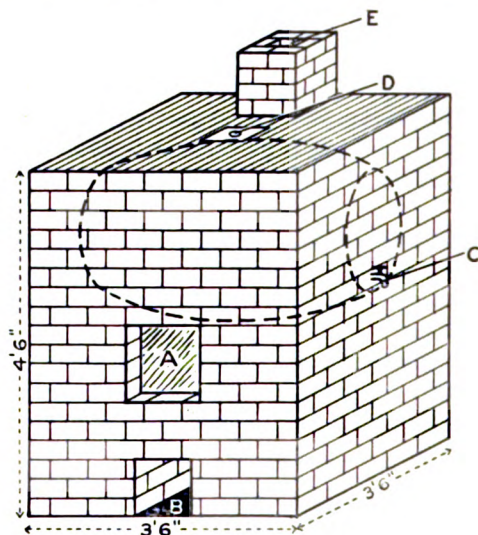
By means of the arrangement described we have found it possible to utilize the heat from the incinerator for the purpose of boiling water for cooking, washing, bathing, etc., and we have found it to be of great use at our advanced dressing station.

The vessel used was an iron barrel, of eighteen gallons capacity, such as is used for containing paraffin. These barrels can be obtained from *estaminets* in most villages.

The incinerator is best made up of bricks, but could be built up with wooden props surrounded by sods and well puddled with clay. Wooden props protected in this manner will not burn.

The method of constructing the incinerator used by us was to build two lateral masses of bricks 3 ft. 6 in. long by 1 ft. 3 in. wide, and

three bricks deep, the space between the masses being about 9 in. wide the gap being closed in at one end. Firebars were placed on these, and the brickwork continued up for about five bricks. In front a space about 1 ft. square is then allowed for, to act as a firedoor, and at the sides the walls are built up to about 2 ft. 6 in. from the ground when the barrel is placed in position, the ends resting on the lateral walls. The brickwork is then continued up, the vessel being completely surrounded by the four walls. The upper surface is best covered by large flat stones or sheets of iron, the only openings being one for the bunghole, and one,



a, Firedoor into which rubbish is thrown ; b, flue underneath the fire bars for the removal of ashes ; c, tap from which hot water is drawn ; d, bunghole for introduction of cold water ; e, chimney. The draught is from b to e, causing the heat to pass around the under surface of vessel. The vessel (a barrel in this case) is indicated by a dotted outline.

about 9 in. square on the side opposite the firedoor for the chimney, which should be built up for about 1 ft. The whole should then be well puddled with clay, the bunghole and tap alone being left exposed. The firedoor can be kept closed by means of a sheet of tin or iron.

The apparatus as constructed for us by Corporal Deacon, R.A.M.C.T.F., works extremely well, and we are able to obtain about thirty gallons of boiling water per day.

The dimensions when complete are : Base, 3 ft. 6 in. by 3 ft. 6 in., height 4 ft. 6 in.

All material for burning is introduced through the firedoor, the ashes collecting in the space beneath the firebars and being removed as often as necessary.

Translation.

FEEDING OF PRISONERS OF WAR IN GERMANY.

(1) **PERSONNEL.**—As all questions in connexion with the feeding are decided by those in charge, it is necessary in camps where the kitchens are well administered that an additional number of individuals who are adapted for the work should be trained, or that in camps for military and civil prisoners which are not yet self-managing in this respect, officers and under officers who are interested in the feeding question should be sent to other camps which are a pattern in these matters, for a period of about one week, in order to be there carefully instructed. This applies to:—

- (a) Officers fitted to take control of the interior economy.
- (b) Military officials who manage the finances and take charge of stores.
- (c) Under officers who would be useful to take charge in kitchens and canteens.
- (d) Soldiers from among the prisoners and the guards who are capable of becoming cooks. The endeavour is to ensure that in every army corps in the camp for military and civil prisoners, in the first place, if no competent personnel is to be found there other persons of the above enumerated categories shall be allotted and be held in readiness for transfer within the army corps.

(2) Self-management as regards interior economy is ordered in the first place for the camps for military and civil prisoners, because this is considered far preferable to the employment of contractors. Nearly all the complaints regarding the feeding come from camps where contractors are employed.

(3) **Contractors.**—Where it has so far not been possible to terminate the agreements with contractors, and endeavours must continue to be made to do so, a most careful and strict control of them must be maintained. In most of the agreements there is a clause to the effect that the contractor must supply a "competent board." Below is given a definition of what is to be understood by the term. Wherever the proper standard is not reached the contractor is to be required immediately to make good the deficiencies, and should he fail to do so this constitutes a reason for immediately cancelling the agreement. The excuse that in consequence of the present rise in prices the contractor cannot any longer supply in accordance with the agreement, is to be met by pointing to the enormous gains previously made by the contractors, which have already been remarked upon in the Reichstag, and that therefore they can afford to supply at a loss now. All requests to make an allowance on any

agreements that are terminated, or to take over remaining stocks at a higher price than their present value are to be refused. On the contrary, it can be claimed that on account of his former profits if a contractor is released from his agreement he should pay a bonus to the military authorities. It is also just and possible to exact compensation from a contractor on account of deficiencies in the quantities supplied and of improper profits in the past. This should not be done, however, if the contractor raises no difficulties regarding the cancellation of his agreement. There is no objection to the taking over of serviceable stocks at appropriate prices.

(4) In every camp, a kitchen administration is to be organized for the purpose of managing its own household economy, or to control the contractor. The committee will be appointed by the Commandant and will consist of the officer supervising the feeding arrangements, the camp surgeon, the paymaster or official in charge of the financial and commissariat departments, and of other persons competent thereto whom the Commandant deems to be necessary.

This committee also makes all purchases, and presents all proposals regarding the messing. Purchases must always be made with consideration of the nutritive qualities of the articles acquired, and for large quantities calculations on the lines of the example given in the attached Table I are to be drawn up. The tables calculated out by König and published by Jul. Springer, Berlin, price 1.60 m., are to form the basis regarding the nutritive quality of various articles. It is especially important to ascertain desirable sources of supply.

(5) The control of the feeding is not limited to the question of cost; where contractors are employed the food that reaches the cooking pots is to be carefully inspected daily, both as regards its weight and its quality, in accordance with the more precise instructions given below and the messing scheme founded upon them.

Where a camp is conducting its own messing arrangements the articles delivered at the kitchen are equally to be inspected with respect to measure and weight. Special importance is to be attached to the provision of good weighing machines and measures. The quality of the food is to be constantly tested. If there is a suspicion of under weight or cheating samples are to be sent to the nearest food laboratory for examination.

In this connexion everything that could call forth criticism and could cast reflection upon the integrity of those responsible for the inspection in the prisoners' camp even in the smallest degree must be strictly obviated, for example, such as supplying the guards with food from the kitchens in the camps for military and civil prisoners, accepting favours from contractors and purveyors.

(6) The co-operation of military and civil prisoners in connexion with the messing arrangements is of the greatest importance. Not only are

particularly cleanly and capable prisoners to be employed for the preparation of the food, but also in especial a trustworthy under officer is to be permanently detailed to the kitchen in connexion with the civil prisoners to take charge of the personnel there and communicate to them the wishes of the military and civil prisoners.

The tastes of the prisoners are to be consulted as far as possible. Home dishes such as it is possible to prepare are willingly permitted, and religious customs in this respect are as far as possible to be considered.

TABLE I.
PRICE AND CONTENTS OF THE ARTICLES OF FOOD, MARCH, 1915.

Article of food	Price per kilo in pfgs.	Caloric contents in 100 gr.	Price per 1,000 calories	Remarks
Soya bean meal ..	0.50	380	13	Valuable pod fruit.
Potatoes	9.5	89	11	Advantageous qualities.
Kohlrabi	9.5	27	35	Recommended as vegetable in moderate quantities.
Carrots	12.7	32	40	Recommended as vegetable in moderate quantities.
Turnips	8.8	85	10	Highly recommended.
Sauerkraut	24	20	120	To be used in small quantities.
French beans	64	33	194	Too dear.
Pork (fat)	140	394	36	Recommended.
Beef (medium fat) ..	140	160	88	Fat meat is the more desirable.
Margarine	150	787	19	Recommended.
Blood sausage	150	249	60	"
Dried cod	65	120	54	"
Fresh fish	50	82	61	"
Herring	42	235	18	"
Red herring	60	167	36	"
Barley	92	338	27	"
Peas	98	262	37	Too dear, and no longer obtainable.
Beans	90	263	34	"
Rice	96	344	28	Dear, but recommended in moderate quantities.
Groats	68	328	21	Recommended for soup.
Oat flakes	92	342	27	Too dear.
Buckwheat meal	96	302	32	" "
Bread	40	214	9	Cheaper than meal.
Cheese (half fat) ..	120	357	34	Expensive.
Skim milk	8	38	21	Recommended.
Sugar, excise standard	37	398	9	The cheapest article of food.
Dough strips (sort of macaroni)	160	344	47	Too dear.
Baking plums	105	272	39	As an agreeable food recommended.
Skim milk curds ..	50	190	26	Recommended on account of its large percentage of albumen.

(7) The normal standard of nutritive food to be given to each prisoner daily averages 85 grm. of albumen, 40 grm. of fat, and 475 grm. of hydrate of carbon or a total of 2,700 caloric units. This refers to persons of medium weight and doing light work. For those doing heavier work, especially for the inmates of the working camp, ten per cent additional

is to be given, while those who are doing absolutely nothing, for instance, in hospital, are to receive ten per cent less. This normal also applies to food supplied by contractors. Should inspection prove that smaller quantities are repeatedly supplied this constitutes a reason for cancelling the agreement.

Besides the actual quantities of necessary nutritive ingredients, however, care is also to be taken to ascertain that the bulk of the daily portion is such as to cause the prisoners to feel really "full." On the other hand, care must be taken in order that the necessary nutrition is forthcoming to provide against the overloading of the stomach. Finally, the careful preparation of the food, its tastiness and attractiveness is to be constantly tested. The best way of ascertaining that the feeding is sufficient is by weighing the prisoners.

(8) A calculation regarding the weekly scheme of messing is to be drawn up on the model of Table II, which is attached purely as an example, and with the co-operation of the camp surgeon. By this means the normal will be attained on the average of the week. Beginning with May 10 in future on the 10th of every month a scheme of this sort for the feeding for the current month will be sent to the Accommodation Department of the Ministry for War.

It is the duty of the medical officer to bring to the notice of the commandant in writing any deficiencies which become apparent in the feeding arrangements. Otherwise he will be held responsible for any harm ensuing to the prisoners from inferior or insufficient food.

(9) The daily diet is to be prepared in accordance with the existing available supplies. Generally speaking, it can be recommended that in the morning the prisoners should receive soup containing 100 gm. of solid substance. At mid-day in most cases there will be a stew containing 500-600 gm. of potatoes, 90-120 gm. meat or 150-160 gm. of fish, or 150 gm. of soya beans or horse beans, and 500 gm. of fresh or the corresponding quantity of preserved vegetables. In the evening 500 gm. of potatoes in their skins with 40 gm. margarine or red herring, tea with 50 gm. of sugar and herring, or 100-150 gm. of cheese, or soup or broth, for example, 150 gm. of rice and 50 gm. of sugar, are recommended.

When prisoners are employed at a distance exceeding two kilometres from the camp they must be supplied where they are working with a warm meal either brought there or prepared on the spot. In this case the chief meal can be given in the evening, while at midday a strong soup rich in fats can be served. Cooking chests are recommended for the transport of the food, and these can be obtained free of cost from the Accommodation Department, War Office. Chests of 50, 40, 30, and 20 litres capacity are in store.

It is desirable so to apportion the ration of 300 gm. of bread that it is chiefly eaten with the lighter meals or between meals. In no case is the bread ration for several days to be issued at one time.

TABLE II.

TO BE RENDERED TO THE MINISTRY FOR WAR ON THE 10TH OF EACH MONTH.

ARTICLE OF FOOD	PERCENTAGE OF CONTENTS					TOTAL CONTENTS				
	Albumen	Fat	Hydrates of carbon	Calories	Price per kg. in pence	Albumen	Fat	Hydrates of carbon	Calories	Price in pence
Mo = morning Mi = mid-day A = evening										
<i>Sunday</i>										
300 grm. bread ..	4.3	0.4	47.3	214	..	12.9	1.2	141.9	642	..
Mo 100 „ bean meal	16.8	0.6	44.0	263	90.0	16.8	0.6	44.0	263	9.0
Mi 100 „ pork (fat)	14.1	35.0	..	394	140.0	14.1	35.0	..	394	14.0
Mi 600 „ potatoes	1.5	0.2	20.0	89	9.5	9.0	1.2	120.0	534	5.7
Mi 500 „ sauerkraut	1.0	0.3	3.1	20	24.0	5.0	1.5	15.5	100	12.0
A 120 „ cheese ..	27.4	23.2	2.1	357	120.0	32.9	27.8	2.5	428	14.0
						90.7	67.8	323.9	2,361	54.7
<i>Monday</i>										
300 grm. bread ..	..	..	..	..	..	12.9	1.2	141.9	642	..
Mo 100 „ oat flakes	10.0	4.0	64.0	342	92.0	10.0	4.0	64.0	342	9.2
Mi 120 „ sausage ..	10.4	10.8	24.5	249	150.0	12.5	13.0	29.4	299	18.0
Mi 600 „ potatoes	..	..	..	..	..	9.0	1.2	120.0	534	5.7
Mi 300 „ carrots ..	0.7	0.2	6.8	32	12.7	3.5	1.0	34.0	160	6.3
A 3 „ tea ..	..	..	..	..	690.0	..	..	..	..	2.0
A 50 „ sugar ..	..	..	100	398	37.0	..	..	50.0	199	1.8
A 160 „ herring ..	18.4	15.7	..	235	42.0	29.4	25.1	..	376	7.0
						77.3	45.5	439.3	2,552	50.0
<i>Tuesday</i>										
300 grm. bread ..	..	..	..	..	..	12.9	1.2	141.9	642	..
Mo 50 „ buckwheat flakes	9.5	0.8	62.2	302	96.0	4.7	0.4	31.1	151	4.8
Mo 50 „ sugar ..	..	..	..	..	..	..	..	50.0	199	1.8
Mi 200 „ fresh fish	16.4	0.3	..	82	50.0	32.8	0.6	..	164	10.0
Mi 20 „ margarine	0.5	84.4	0.5	787	150.0	0.1	16.9	0.1	157	3.0
Mi 600 „ potatoes	..	..	..	..	..	9.0	1.2	120.0	534	5.7
Mi 500 „ kohlrabi	0.7	0.2	5.5	27	9.5	3.5	1.0	27.5	135	4.7
Mi 50 „ onions ..	..	..	..	..	..	..	..	..	..	2.3
A 500 „ potatoes in skin	..	..	..	..	..	7.5	1.0	100.0	445	4.7
A 160 „ red herring	20.4	7.3	..	..	50.0	32.6	11.7	..	267	10.0
						103.1	34.0	470.6	2,694	47.0
<i>Wednesday</i>										
300 grm. bread ..	..	..	..	..	..	12.9	1.2	141.9	642	..
Mo 100 „ groats ..	8.5	1.6	68.0	328	68.0	8.5	1.6	68.0	328	6.8
Mi 100 „ pork ..	..	..	..	..	..	14.1	35.0	..	394	14.0
Mi 600 „ potatoes	..	..	..	..	..	9.0	1.2	120.0	534	5.7
Mi 500 „ turnips ..	0.9	0.1	20.3	85	8.8	4.5	0.5	101.5	425	4.4
A 150 „ rice ..	6.4	0.5	77.0	344	96.0	9.6	0.8	115.5	516	14.4
A 50 „ sugar ..	..	..	..	..	..	..	..	50.0	199	1.8
						58.6	40.3	596.9	3,038	47.1
<i>Thursday</i>										
300 grm. bread ..	..	..	..	..	..	12.9	1.2	141.9	642	..
Mo 100 „ oat flakes	..	..	..	..	..	10.0	4.0	64.0	342	9.2
Mi 100 „ beef ..	19.4	71	..	160	140	19.4	7.1	..	160	14.0
Mi 600 „ potatoes	..	..	..	..	..	9.0	1.2	120.0	534	5.7
Mi 500 „ carrots ..	..	..	..	..	..	3.5	1.0	34.0	160	6.3
A Tea, sugar, her- rings	..	..	..	..	..	29.4	25.1	50.0	575	10.8
						84.2	39.6	409.9	2,413	46.0

TABLE II—*Continued.*

ARTICLE OF FOOD	PERCENTAGE OF CONTENTS					TOTAL CONTENTS				
	Albumen	Fat	Hydrates of carbon	Calories	Price per kg. in pfennigs	Albumen	Fat	Hydrates of carbon	Calories	Price in pfennigs
Mo = morning Mi = mid-day A = evening										
<i>Friday</i>										
300 grm. bread ..	..	..	..	..	..	12.9	1.2	141.9	642	..
Mo Buckwheat, sugar	..	..	..	..	..	4.7	0.4	81.1	350	6.6
Mi 180 grm. codfish ..	20.0	2.0	..	120.0	65	36.0	3.6	..	216	117.0
Mi 20 „ margarine	..	..	..	..	..	0.1	16.9	0.1	157	3.0
Mi 600 „ potatoes	..	..	..	..	..	9.0	1.2	120.0	534	5.7
Mi 500 „ kohlrabi	..	..	..	..	..	3.5	1.0	27.5	135	4.7
Mi 50 „ onions ..	..	..	..	..	..	..	..	..	..	2.3
A Potatoes in skins, herrings	..	..	..	..	..	40.1	12.7	100.0	712	14.7
						106.3	37.0	470.6	2,746	48.7
<i>Saturday</i>										
300 grm. bread ..	..	..	..	..	..	12.9	1.2	141.9	642	..
Mo 100 „ groats ..	..	..	..	..	..	8.5	1.6	68.0	328	6.8
Mi 150 „ soya beans	24.5	2.0	55.5	380	50	36.7	3.0	83.0	570	7.5
Mi 40 „ margarine	..	..	..	..	..	0.2	33.8	0.2	315	6.0
Mi 600 „ potatoes	..	..	..	..	..	9.0	1.2	120.0	534	5.7
Mi 500 „ turnips ..	..	..	..	..	..	4.5	0.5	101.5	425	4.4
A Rice, sugar	..	..	..	..	..	9.6	0.8	165.5	715	16.2
						81.4	42.1	680.4	3,529	46.6
<i>Totals—</i>										
	Albumen	Fat	Hydrates of carbon	Calories	Price in pfennigs					
Sunday ..	..	90.7	67.3	323.9	2,361	54.7				
Monday ..	..	77.3	45.5	439.3	2,552	50.0				
Tuesday ..	..	103.1	34.0	470.6	2,694	47.0				
Wednesday ..	..	58.6	40.3	596.9	3,038	47.1				
Thursday ..	..	84.2	39.6	409.9	2,413	46.0				
Friday ..	..	106.3	37.0	470.6	2,746	48.7				
Saturday ..	..	81.4	42.1	680.4	3,529	46.6				
Grand total ..	601.4	305.8	3,391.6	19,333	340.1					
Average per diem	85.9	43.7	484.5	2,762	48.6					

(10) In connexion with the feeding of the prisoners the following articles of food are to be recommended: Raw sugar as an addition to coffee or tea or for use with porridge and soup; fresh or pasteurized skim milk, if obtainable at a price between five and ten pfennigs per litre, for the preparation of soup; fresh and cured fish; fresh or preserved vegetables and fruit, which are in many cases valued and easily procurable forms of nourishment. On account of the scarcity of tin, however, the obtaining of conserves in tins must be avoided as far as possible. As in view of the present scarcity of food all waste must be avoided, attention is specially directed to the fact that the loss arising from the peeling of potatoes may be as much as thirty per cent, and this

can be in part avoided by only peeling the large potatoes, and those thinly, while the small ones should be picked out and used at other meals cooked in their skins, or the potatoes after being thoroughly washed should be peeled by having their skins removed by means of birch brooms. The weight of the potatoes will be the weight of what are actually sent into the kitchen. Care is to be taken to make the best possible use of the kitchen refuse.

(11) Obtaining supplies. Generally speaking everything is to be obtained locally. If milk, potatoes, meat, vegetables, or other articles can be obtained direct from the producers this will usually be the most advantageous course. Things which will keep, tuberous vegetables, and small articles can be obtained from purveyors in the vicinity if they are cheap and good. It is recommended to make the necessary purchases for the month in three orders and to compare the prices with the wholesale prices. As a number of foodstuffs are at present confiscated and the sale of them centralized the War Department has taken measures to ensure the necessary quantities being supplied to the prisoners of war. This renders it possible to obtain raw materials more cheaply than hitherto. The camp will be constantly kept informed as to the articles available at the moment and their prices. The quantities required are to be notified directly to the accommodation department of the Ministry for War to enable them to be supplied at wholesale prices. At present this refers to the following: Sugar, potato meal, rice, soya beans, cod-fish, corned meat, tea, dried prunes, etc.

To enable the various camps to receive offers the acting staffs of army corps are respectfully requested to at once inform the Prisoners' Supply Branch of the Accommodation Department of the Ministry for War as to the camps which are managing their own interior economy, and also to notify whenever fresh camps are added to the list. This Department will in future deal with all matters in connexion with such supplies.

(12) Well organized canteens, either on the tenant system or under self-management, in which are sold cheap and good articles of food and enjoyment, such as milk, coffee, sausages, bacon, roast potatoes, sugar, marmalade, fish, naturally constitute a good source of nourishment for the prisoners. They must likewise have for sale articles of clothing, sewing, and cleaning materials at moderate prices.

In letting out canteens the object is not to obtain a high rent, but rather to ensure that the prisoners can obtain good and cheap articles.

(13) From April 25 the maximum cost of messing per prisoner per day in self-managing camps is fixed at sixty-six pfennigs. The increase is chiefly made on account of the decrease of the bread ration from five hundred to three hundred grams. In cases where adequate messing is insured for a less sum than sixty-six pfennigs, the balance of this sum shall be applied to the advantageous purchase in advance of articles of food or to provide additional food when hard work is being performed,

such as is referred to in Paragraph 7. Advances may also be made in respect of purchases.

(14) It is a special duty of camp commandants to supervise the messing of the military and civil prisoners and also the work of the kitchens and canteens. The inspectors of prisoners' camps and the acting medical officers of army corps are to give their constant and special attention to the messing of the military and civil prisoners.

By Order,
(Sgd.) FRIEDRICH.

Reviews.

SURGICAL MATERIALS AND THEIR USES. Alex. MacLennan. London: Messrs. Edward Arnold, 1915. Pp. viii. and 252. Price 4s. 6d. net.

This book deals with the appliances, materials, and instruments that are commonly used by the surgeon.

It commences with a description of the different materials used in bandaging, and goes on with a description of the various forms of bandages. The next chapter is devoted to the description of splints and their method of application.

A chapter on dressings succeeds, followed by some remarks on antiseptics and surgical technique. The last chapter is devoted to instruments commonly in use.

There does not appear to be anything in this book which could not be obtained in the ordinary systems of surgery, but the reading of it will give a student some idea of the different materials and appliances which he will have to use in his career.

If one wished to criticize the book, it would be to say that it is at once too full and yet not full enough, and that in a book specially devoted to this purpose one might expect fuller details of the surgical materials and the source from which they are derived. Nevertheless, the student will find it a useful reference book which he can consult when in doubt as to what splints or dressing to use.

C. W.

MENTAL DERANGEMENTS IN INDIA. By Overbeck-Wright. Calcutta: Thacker, Spink and Co., 1912. Pp. xx. and 366. Price 9s. net.

In presenting his little manual Captain A. W. Overbeck-Wright is to be congratulated on placing in the hands not only of the medical services but also of the profession at large, both at home and in India, a handy volume bringing the science of psychiatry up to date.

In his preface he modestly disclaims much originality and acknowledges his indebtedness to the researches of such leaders as Bruce, Clouston, Bevan-Lewis, Maurice-Craig, Craepelin, Berkley, Savage, Mercier, and Major Ewens, but he has followed his own arrangement of the subject matter in a manner clear and concise so as to be easily referred to,

omitting the use of many of the technical terms and classifications which are a stumbling-block to the practitioner not an expert in psychology.

The passages bearing on psychoses peculiar to India are for the most part new to us at home, such as the description of the microcephalus called Shah Daula's mice, also the drug toxins, notably in the chapter on Indian hemp, and its varieties.

It is interesting to learn that general paralysis of the insane in India is so rare as compared with Europe—a fact that bears on the proverb of, "No Syphilis, no G.P.I."

Other special points are the incidence of mental enfeeblement following mud-eating, associated with *Ankylostoma duodenalis*; also the insanity accompanying malarial fever.

The discussion on the main differences between European and Indian psychoses is interesting and shows study of the varying conditions of life, race, customs, and creed.

The hints on examination of the insane and the description of legal procedure in India should be valuable to the practitioner in that country, and any medical man going out would be wise in equipping himself with this book, which indeed would be found useful to the busy man in practice at home.

G. M.

MINOR SURGERY AND BANDAGING. Pollard. New edition by Morriston Davies. London: Messrs J. and A. Churchill, 1914. Pp. x. and 467. Price 7s. 6d. net.

This is a new edition of a book which has stood the test of time and which has been used by many students and house officers. It describes all that is required to be known by the house surgeon in the way of treatment of cases and the technique of his profession. It starts with good advice to the house surgeon in his dealings with the various officers with whom he will be brought into touch in his ordinary hospital routine and defines his position both as to subordinates and superiors; and the advice offered seems to be sound.

The book goes on to describe ordinary modern surgical technique and all that is connected with that branch.

A chapter is devoted to the treatment of hæmorrhage. Chapters follow on minor surgery, treatment of scalds, retention of urine, different kinds and methods of application of trusses, minor operations such as tracheotomy, intubation, aspiration of the thorax, lumbar puncture and the different methods of administering saline fluid. Then there is a chapter on the after-treatment of operations, and following that is a section devoted to bandages, splints, and fractures and dislocations.

The book is finished up by a chapter on anæsthetics, both local and general, by Dudley Buxton.

Speaking as a whole, we could say that this book has fully maintained its reputation, and that the new edition will supply a want, and that the book will be more especially useful for senior students and to those who are filling the junior appointments at a hospital.

C. W.

Current Literature.

Vaccine Treatment of Enteric Fever.—E. B. Krumbhaar, M.D., and R. Richardson, M.D., in the *American Journal of the Medical Sciences* for March, 1915, discuss the value of typhoid vaccines in the treatment of typhoid fever. They find that they are able to report distinctly favourable results from three years' observation on cases at the Pennsylvania Hospital. In the later cases, whether from the larger doses employed or from experience acquired, the results were so favourable that they feel justified in recommending the proper use of typhoid vaccine as a specific and valuable form of treatment of this very important disease.

They report a series of ninety-three cases, and refer to the work of Fraenkel, Pescarolo and Quadrom, Watlers and Eaton, Smallman, Semple, etc.

The vaccine used in the first series was prepared by growing the *Bacillus typhosus* (strain, Rawlings) on agar and suspending the growth in normal saline solution.

After shaking and counting the suspension, the organisms were killed by exposure to a temperature of 60° C. for one hour. The vaccine was made with 1,000 millions bacilli per cubic centimetre and three per cent lysol added. The later vaccine was killed by heating to 56° C. for half an hour.

Series I.—The total dosage varied from 50 millions to 1,650 millions given in 1 to 5 doses.

In 44 cases there were 4 deaths and 12 complications.

Series II.—Thirty-three cases treated to total doses varying from 200 millions to 1,450 millions (1 to 3 doses). There was only one death in this series (3·2 per cent).

Usual method :	150,000,000	on 10th day.
" "	400,000,000	" 13th "
" "	700,000,000	" 16th "

Total dose ... 1,250,000,000

Series III.—Sixteen cases ; no deaths ; no relapses. Total dosage ranged from 850 millions to 3,350 millions.

Method :	250,000,000	on 19th day.
" "	500,000,000	" 22nd "
" "	1,000,000,000	" 26th "
" "	800,000,000	" 32nd "
" "	800,000,000	" 36th "

Total dosage ... 3,350,000,000

Another case received 600 millions on the fourteenth day of disease ; this was followed by a rise of temperature of 3°, his temperature then fell steadily, reaching normal in thirty-six hours, where it remained.

Case 93 : 600,000,000 on 6th day.
 " 1,000,000,000 " 9th "
 " 1,000,000,000 " 12th "

Conclusions.—(1) The best results are obtained if the injections are begun early in the disease, especially before the tenth day.

(2) The contra-indications for vaccine treatment are not yet clear. Vaccines should not be used in moribund or very toxic cases, during hæmorrhages or suspected perforations, or in such complications as pneumonia or otitis where other micro-organisms are involved.

(3) The dosage must vary within certain limits for each person. The more severe the disease the smaller and more cautious should be the dosage. With vaccines prepared as the authors suggest, they found the best initial dose for an average adult was 500 millions, followed by larger doses at three days' interval; in no case was any severe local or general reaction noted.

D. H.

Prevention of Tetanus.—Piorkowski (*Münch. med. Woch.*, February 16, 1915, p. 238) grows the tetanus bacillus on glucose agar anaerobically at 42° C. to prevent spore formation, sterilizes by heating on several days at a temperature of 60° to 80° C. and finally at 110° C.; dries and powders the culture. He inoculated mice with 0.05 grm. of this powder, and after six to forty-eight hours he infected them with garden soil in such quantities that all the controls died in three days with the usual symptoms of tetanus. All the vaccinated mice remained healthy. He also inoculated mice with garden mould and after varying periods injected the vaccine. They were protected up to sixteen hours after the introduction of the virus. Mixtures of one part of dried culture and three or less of earth were innocuous, though one of culture and four or five of soil caused death from tetanus. The vaccine alone is harmless to mice. He experimented with glucose broth cultures killed at 110° C. and filtered; 0.5 c.c. protected mice and guinea-pigs infected with garden mould sixteen to twenty-four hours after the vaccination. Curative doses were effective thirty-six hours after the introduction of the virus. Piorkowski recommends that every soldier should carry this tetanus powder for application immediately after the infliction of a wound. He suggests that malignant œdema and diphtheria may be prevented or cured in a similar manner.

C. B.

Report of an Evening Medical War Meeting in Lille, on December 16, 1914 (*Münch. med. Woch.* for January 12, 1915, p. 70).—Herr Braun, after a lecture by Herr Thole, gave an account of his experience of English bullets. He had seen some thousands of bullet wounds caused by English bullets, and, as a rule, he had observed the same lesions as one is accustomed to see inflicted by modern infantry ammunition. As usual, bullet wounds of the lungs were favourable in the majority of cases, bullet wounds of the abdomen were unfavourable in the majority of cases, in bullet wounds of the head "überwogen die Durchschüsse über die Steckschüsse." Owing to the proximity of the trenches, one must also assume that the bullets are frequently already deformed by ricochetting off the ground. It is absolutely impossible from the nature of a wound or from particles of bullet to detect a Dum-Dum lesion. In

shooting experiments with English ammunition, the penetrative force was as great as with the German infantry bullet, the distortion was typical: kinking in the middle, lead pressed out behind, the point and the places where the lead and aluminium cores were in contact with each other, were in all cases intact. The intact English bullet is, therefore, no Dum-Dum bullet. If one attempts to break off the point of the cartridge with the English rifle, as the English are supposed to do, the greatest difficulty is experienced, one must throw the whole weight of the body on it, and one easily bends the cartridge so that one can no longer load with it. In all cases the self loading mechanism failed, so that invariably only one cartridge could be loaded at a time. The range and the penetrative efficiency of the broken-off bullet is much reduced. *The Dum-Dum bullets of the English are mainly a product of the fantasy.*

Herr Franz did not know of a single case in which one could with justice assume the existence of a Dum-Dum lesion. The Roentgen ray picture is not convincing. One finds in 50 per cent of the "Diaphysenschüsse" portions of the outer case and lead core. Bruns' stipulation that longitudinal tears must be visible in the wound of entry, and that the wounds of entry and exit, apart from injuries to the muscles, must not differ essentially from each other, must be fulfilled. The intact English bullet is no Dum-Dum, but it is puzzling why the construction of the bullet is so complicated, and why it is capable of being broken off.

Herr Mandel stated that numerous rifles with Dum-Dum bullets had been found in the trenches. Insufficient stress had been laid on the slight thickness of the outer casing, which favoured the escape of the lead after the casing was shattered; it is this which is inhuman. Also, when striking sideways, it (the English bullet) acts differently and more severely than ours.

Herr Schmieden stated that by amputation (of the point), the English bullet becomes a hollow-pointed bullet, and acts, therefore, so seriously.

Herr Neter stated that the lead of the second core acts more like a fluid, and gives to the bullet a "Nachschlag."

Herr Reh stated that the matter is not yet quite clear, but the apparatus for cutting off (the point of the bullet) is very striking, and must have some special purpose. Although we can prove nothing by the lesions themselves as to the action of Dum-Dums, yet we have found rifles with these cartridges in the barrel in the trenches, and these cartridges (have been found) on prisoners. Instructions must, therefore, have been given (to the soldiers). It happens also that lead bullets break up and make small wounds of exit.

Note.—The words bracketed do not appear in the original, and have been inserted by the translator to make the sense more clear.

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Journal
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Original Communications.

ON THE PREVENTION OF "FROST-BITE" AND OTHER
EFFECTS OF COLD ("FROIDURE" OR "FRIGORISM.")¹

By S. DELÉPINE.

Public Health Laboratory, University of Manchester.

PART I.

CONTRIBUTION TO AN EXPERIMENTAL STUDY OF "FRIGORISM."

GENERAL REMARKS.

THE term "frost-bite" suggests some destructive lesion resulting from the action of cold.

Many of the soldiers who last winter had to stand for a considerable time in trenches flooded by cold water suffered severely from this exposure, but in a fairly large proportion of cases necrotic lesions were either absent or of secondary importance. This led several observers to establish a distinction between what they have called "trench foot," "water-bite," etc., and ordinary frost-bite.

From a scientific point of view, the term frost-bite is inconvenient when it is used as a general term to designate effects of exposure to cold. The alternative terms which I have mentioned are still more unsatisfactory, for in the absence of cold neither trench life nor wading in water can produce the morbid states which these terms are intended to indicate.

¹ Five figures and three diagrams at the end of the paper.

In the "Nomenclature of Diseases," published by the committee appointed by the Royal College of Physicians of London, no other term is given to cover the morbid states which result from exposure to cold than "Effects of Cold," *Frigoris effectus* (p. 277, fourth edition). Of the local effects the only two which are named are: Chilblain or *Erythema pernio* (p. 261), and Frost-bite or *Gelatio* (p. 263).

The term *Froidure*, used by several French writers, is a convenient *general term*, but cannot be easily translated into English. *Crymose* (Crymosis), according to Littré, has been suggested, and would be suitable but somewhat pedantic. *Frigorism* or *Frigidism* would be more generally understood, but requires the sanction of use. (Calorism could be used as a parallel general term for the effects of heat.)¹

Notwithstanding the difficulty of finding a suitable term to indicate the group of morbid states brought about by cold, many observers have clearly recognized that several correlated lesions may be brought about by the action of this ætiological factor, and that chilblains and frost-bites are only two of the local effects of frigorism.

EFFECTS OF EXPOSURE TO COLD (FRIGORISM).

The general effects of exposure to cold, or *General Frigorism*, have been studied by various observers, but are not yet clearly understood.

Three degrees of *Local Frigorism* have been recognized by authors (Lancereaux, "Anatomie Pathologique," vol. i, p. 816, Paris, 1875-77).

As regards the extremities, and particularly the skin, each degree is characterized by the following lesions:—

First degree.—Local anæmia, causing pallor, which may persist or be followed by hyperæmia, characterized by redness which may pass into purple. The colour disappears on pressure. Under the influence of warmth the skin becomes the seat of tingling, itching and other more or less painful sensations. In certain persons when this state persists for some time or recurs, some œdema takes place, the part becomes swollen and assumes the characters generally associated with chilblains.

Second degree.—The discoloration of the skin is more marked

¹ *Subcalorism* might be used instead of frigorism, and *supercalorism* instead of calorism as being more in accordance with our notions of heat.

and darker. There is marked swelling, and an accumulation of clear or blood-stained serum under the cuticular layers of the skin may give rise to bullæ. Superficial ulcerations may occur under these bullæ. Sometimes dry, painful fissures are produced.

Third degree.—Distinct and more or less extensive necrotic lesions are produced. The parts affected are dark or pale, soft or dry and hard (moist or dry gangrene).

Cold may produce serious lesions without the parts affected having been actually frozen. On the other hand, Hunter's experiments on the rabbit's ear have shown that freezing does not necessarily bring about the death of the affected tissues, although it may give rise to serious complications when circulation is restored. The duration of the exposure and the size of the part exposed have a considerable influence upon the effects.

FACTORS INFLUENCING THE EFFECTS OF COLD UPON THE BODY.

It is a matter of common experience that the face, hands and feet can be exposed to still, dry air at a temperature several degrees below 0°C . for hours without any serious discomfort being experienced. Immersion of the hands or of the feet in water at a temperature of 0°C . is followed immediately by a feeling of intense cold and very soon after by painful cramps and loss of sensation; this occurs in a few minutes if the hands and feet are motionless.

Misty air at 0°C . produces a sensation of cold much more marked than is caused by dry air at several degrees below 0°C . Rushing air or water at 0°C . causes a sensation of cold much more intense than that produced by still air or water at the same temperature.

These are not subjective phenomena only, as can be proved by a very simple experiment, which I carried out as follows: I clasped tightly the bulb of a thermometer in the palm of one hand so as to establish as perfect a contact as possible between the skin and the bulb and to prevent access of air as much as practicable. The temperature indicated by the thermometer under these conditions is determined (a) by the relative areas of the parts of the bulb in contact with the skin and of those to which air has more or less free access, (b) by the temperature of the skin, and (c) by that of the air.

I found on one occasion that the temperature indicated by the thermometer held in the hand was 31.5°C ., the temperature of the

room being 17°C . Without relaxing my hold of the thermometer I passed into a refrigerator, the walls of which were covered with hard ice; the temperature of the air in this chamber was -1°C . to -0.5°C . After ten minutes the thermometer held in the hand indicated a temperature of slightly over 31°C ., and the hand felt cool but not unpleasantly cold.

After returning to the room at 17°C . I plunged the hand, still holding the thermometer exactly in the same way, into a large basin of water at 17°C . (i.e., at exactly the same temperature as the air). This produced immediately a sensation of coldness in the back of the hand, and two minutes later the temperature indicated by the thermometer held in the hand had fallen to 29°C . The palm of the hand still felt comfortably warm, very little water having penetrated between the fingers, but on moving the hand in the water the temperature indicated by the thermometer fell to 27°C . in a little over a minute. At the same time I felt that the small amount of water which had been warmed by contact with the skin, when the hand was still, was being replaced by cold water.

When a part of the body is surrounded by a medium at a lower temperature, heat passes from the body into the external medium as long as the temperature of the body is higher than that of the medium. When the amount of heat lost by one part of the body can be replaced by the heat brought to that part by the circulating blood, there is only a very superficial slight cooling of the part. This, in an ill-nourished and abnormal individual, might ultimately lead to a general cooling of the body, which would also affect the part specially exposed.

If, on the other hand, the loss exceeds the supply of heat, there is after a time a local cooling which, when it reaches a certain point, interferes materially with the functions of the tissues. This local cooling may exceed considerably that of the body as a whole without bad effect. A small part of the body may actually be frozen without death of that part ensuing, but when the internal temperature of the body falls below 24°C . a fatal result may be expected.

A consideration of these and of other well-known facts leads one to the conclusion that the effects of exposure to cold depend upon a number of factors, the most important of which are:—

- (1) The temperature, the thermo-conductivity and the movements of external media coming in contact with the body or part of it.

- (2) The duration of the exposure.

- (3) The bulk and superficial area of the part exposed.
- (4) Any state of the integuments or other limiting membranes which may influence their thermo-conductivity.
- (5) The amount and velocity of the flow of blood through the part.
- (6) The state of nutrition, activity and soundness of the tissues, locally and generally (the kind and amount of food available being included under nutrition).

GASEOUS AND WATERPROOF COVERINGS AS A PROTECTION AGAINST COOLING.

These preliminary remarks are sufficient to indicate the line of thought which led me last winter to recommend the adoption of waterproof coverings for the feet and legs of our soldiers for the purpose of preventing the occurrence of frost-bites.

Before communicating my views to the Director-General of the Army Medical Service last January, I conducted a number of experiments, three of which are mentioned in a preliminary paper (*Lancet*, February 6, p. 271, and February 27, p. 463).

I propose now to deal in greater detail with these and a few more experiments. As a matter of convenience, I will describe these experiments in sets.

EXPERIMENTAL INQUIRY.

In the first instance I compared various kinds of waterproof fabrics, and after some trials I came to the conclusion that thin oil-silk was the most suitable material for the purpose in view, but the kind I wanted for my experiments not being obtainable, I had to manufacture the material, and early in January I was able to make bags and cylindrical vessels entirely suitable for the tests. The oil-silk, prepared by the method which I finally devised, is very thin (0.1 to 0.2 mm.) and very soft, and with this material I was able to make the absolutely water-tight bags and beaker-like vessels which were used in my experiments.

First Set of Experiments. Influence of Coverings of Dry Air, Moist Air, Water or Fat upon the Rate of Cooling of a Mass of Water (Diagram I and fig. 1).

The mass of water was contained in an absolutely waterproof cylinder made of oil-silk 0.12 to 0.2 mm. thick. The diameter of the cylinders used varied from 24 to 28 mm., the height 140 to 160 mm. The cylinder A (Diagram I) was closed at its lower end by a

cork (a''), the upper opening was also provided with a cork (a') with a central opening which served to keep a thermometer (1) in an axial position. These oil-silk vessels were not quite regular in shape, and were somewhat deformed when used, as will be explained further on, so that their capacity could not be accurately calculated from the measurements given above. The amount of water they contained was actually measured. The thermometers employed in most experiments were Richard recording bomb thermometers (figs. 1, 2 and 3). In several experiments mercurial thermometers were used for purposes of control, because *at the temperature at which observations were made* the readings of one of the Richard thermometers (which had been adjusted for temperatures of 100° C. to 150° C.) were usually somewhat low.

The bulbs of these thermometers measured 10 mm. in diameter and 110 mm. in length. When 50 c.c. of water was poured into the narrower tubes, the bulb of the thermometer was completely immersed. (With the 28 mm. cylinder it was necessary to use 55 c.c.) The time taken to raise the temperature of the bulb enough to cause the recording pen to rise from 10° C. to 30° C. was a little less than one minute when the bulb was immersed in water at 45° C. The time taken for the pen to fall from 30° C. to 10° C. when the bulb was transferred from water at 37° C. to melted ice was a little over half a minute in the case of thermometer A, and less than half a minute in the case of thermometer B, which responded somewhat quicker than thermometer A to sudden changes of temperature. The tracings given by both thermometers plunged side by side in the same mass of fluid, were parallel when the changes of temperature were gradual, but thermometer B records were usually 2° C. lower than those of thermometer A, both at 0° C. and 45° C. The readings of thermometer A nearly agreed with those of a good mercurial thermometer.

These details are given to show that although, from the nature of the vessels and apparatus used in my experiments, the results cannot be considered as accurate as those of well-conducted physical experiments should be, yet care was taken to obtain results, of sufficient accuracy to make comparison possible and useful.

The various coverings, viz., dry air, moist air, and water, of which I desired to study the influence on the cooling of the mass of water, were confined between one of the oil-silk cylinders which have been described and a wider cylinder of the same material.

This outer cylinder measured 35 mm. in diameter, so that the annular space between the inner 28 mm. cylinder and the outer

cylinder measured $3\frac{1}{2}$ mm. in width. To keep the two membranes asunder, a layer of knitted woollen fabric about 3 mm. in thickness was used.

In some preliminary experiments, the inner cylinder was plunged without external covering into the ice-cold water. In other experiments a layer of lard of a uniform thickness of $1\frac{1}{2}$ mm. was applied to the surface of one of the smaller cylinders, by means of a piece of filter paper upon which the lard had been evenly spread. This tube was plunged into the ice-cold water without any other covering.

The external cooling medium was in all cases one litre of salt water mixed with ice (C) broken small. This water, which remained during the whole length of each experiment between -2°C. and -0.5°C. , was contained in a glass cylinder. When the oil-silk cylinders were plunged into this vessel, the ice-water rose to a height of 14 cm., and its level was slightly above that of the 50 or 55 c.c. of water in the inner cylinder. I should add that all these experiments were conducted with small vessels to reduce the duration of some of the observations.

The results of one set of typical experiments are summarized in the table on next page.

The meaning of the observations summarized in Table I is made very clear by diagram I, which is based upon the figures given in the table and the tracings obtained by means of the recording thermometers. [These tracings are of too great a length for reproduction. Tracings relating to shorter experiments have been reproduced to illustrate another part of this paper (fig. 5).]

Owing to the purpose in view, the waterproof material used in most of my experiments was oil-silk, but similar results were obtained with other impervious coverings, such as india-rubber, tin-foil, thin iron sheeting, etc.

It was not necessary to prove the well-known fact that the presence of a layer of air, or of some other bad conductor of heat between a warm body and a cold external medium reduces the amount of heat lost in a given time. The object of my experiments was to ascertain whether a THIN LAYER of *moderately dry or slightly damp air* was sufficient to reduce the loss of heat to the necessary extent. A thin layer of moderately dry air is nearly ten times more effective than a layer of water of the same thickness when both air and water are motionless. The *difference between dry air and water* would have been greater. A layer of lard, probably thicker than could be uniformly spread over the surface

of a foot, was seven or eight times less effective than a layer of moderately dry air.

It is, therefore, clear that the loss of heat which has to be made good by tissue changes and circulating blood when any part of the body is exposed to a cold medium, is very much more rapid when the medium directly in contact with the skin is water or fat, than when it is air, dry or damp.

TABLE I.—RATE OF COOLING OF 50 OR 55 C.C. OF WATER AT 34° C. CONTAINED IN AN OIL-SILK CYLINDER WITH AN EXPOSED SURFACE OF 10·5 SQ. CM. AND SURROUNDED BY 1,000 C.C. OF WATER AT - 1° C. TO 0·5° C. (TEMPERATURE OF EXTERNAL AIR 14° C. TO 15° C.)

Fall of temperature scale*	TIME TAKEN FOR THE LOSSES OF TEMPERATURE INDICATED IN THE FIRST COLUMN TO TAKE PLACE.							
	Preliminary tests			Inner oil-silk cylinder coated with a 1·5 mm. thick layer of lard and filter paper. No other covering	Space between the outer and the inner oil-silk coverings occupied by			
	Bulb of thermometers A and B transferred from warm water to the ice water simultaneously		Inner oil-silk bag with enclosed thermometer bulb and containing warm water plunged directly into ice water		Wool immersed in water	Wet wool and moist air	Wool and air comparatively dry	
	A Min.	B Min.						Min.
Fall from				Min.	Min.	Min.	Min.	
34 to 30			}	1·6	1·2	1·6	4·5	
30 „ 26	0·30	1·3		}	0·9	0·7	1·4	5·4
26 „ 22					1·2	0·8	1·6	6·5
22 „ 18					1·5	1·3	2·4	6·6
18 „ 14			2·8		2·0	4·6	7·0	
14 „ 10	1·2	1·0	}	1·1	3·6	3·5	6·0	
10 „ 6				1·6	8·4	5·4	8·5	23·8
6 „ 2				3·8	17·2	14·4	19·5	69·4
2 „ 0				6·0				126·0
Total	3·0	2·30	15·0	37·2	29·3	45·6	266·0	

N.B.—The total number of minutes given at the bottom of each column may be considered as approximately accurate. The details relating to shorter periods are less accurate owing to the difficulty of avoiding serious errors of observation in the mensuration of small quantities when very accurate apparatus and time are not available. The figures given in the table are, however, useful because they indicate certain important relations.

* It was found on account of the smallness of the vessels difficult to begin all the experiments at the same temperature.

If heat leaks from the part more rapidly than it is brought to it by the circulating fluids, the part becomes colder. The *rate of cooling* is, therefore, a matter of great importance, more especially when the cold external medium is in motion and unlimited in amount, for it is then capable of absorbing what for practical purposes is an unlimited amount of heat.

These considerations indicate clearly that loss of heat from the skin can be considerably reduced by any device preventing the skin from coming directly in contact with a cold external medium and at the same time securing the presence of a layer of air between the skin and the external medium.

For physical experimental purposes, leakage of heat could be best prevented by surrounding the object by a space free from gaseous or other matter, but the protection of the limbs of an active individual is a more difficult matter, and the only practicable way to meet the requirement is to adapt the garments so as to obtain the best possible results without interference with the activities of the individual.

On account of these difficulties I was led to recommend that, for the purpose of preventing the effects of cold, the skin should be protected by a dry loose woollen fabric covered externally with a waterproof material. In order to determine whether this device would be adequate and practicable, I made a number of experiments, the first of which were devoted to the control of the experimental methods used.

Second Set of Experiments.

These experiments had for object to ascertain the value of the records obtained by means of the apparatus available. This apparatus had to be used because the construction of more suitable apparatus would have involved a considerable waste of time. The Richard bomb recording thermometer (see figs. 1, 2, and 3) consists of a small, metallic cylindrical reservoir, the *bomb* or *bulb*, which is connected by means of a long, slender, flexible, metallic tube with a flat, thin-walled, metallic chamber, elliptical in transverse section and slightly curved longitudinally; the reservoirs and connecting tube are filled with alcohol. Any dilatation of the fluid contained in the bulb causes an increase of pressure in the curved flat tube (at the other extremity of the connecting tube), the shape of which is altered thereby. This causes a displacement which is transmitted by means of a suitable gear to a writing lever, the displacements of which are traced on a revolving cylinder. A second flat tube is placed near the one connected with the bulb, and acts on the lever in an opposite direction for the purpose of correcting the effects of variations in the temperature of the air.

These thermometers are very sensitive and they give very reliable curves particularly well-suited for comparative observations,

but it is necessary to take account of the fact that some of these thermometers react to heat a little quicker than others, one must also determine (by means of a standard mercurial thermometer) the exact value of the highest and lowest points in the tracings. Within a moderate range of temperature the displacement of the writing end of the lever is almost exactly proportional to the temperature.

The size of the bulb (11 cm. by 1 cm.) is inconvenient when this apparatus is used for taking surface temperatures. The bulb can however be fairly completely covered by the closed hand (fig. 4). With regard to the foot, a much less perfect contact is obtainable. It is, however, possible to fix the bulb behind the internal malleolus to the skin in such a way that there is good contact along the whole length of the bulb, and that at least one-third of the circumference is closely applied to the skin. To obtain this result the bulb is pressed against, and fixed to, the skin by means of straps of india-rubber plaster which, if carefully applied, protect both the thermometer and the part of the skin in contact with the bulb from the free access of air or water (see fig. 2). To keep the bulb in a fixed position, the ankle is also bandaged firmly, but not so tightly as to interfere with circulation.

Under these circumstances, the temperature indicated by the thermometer is distinctly lower than that recorded by a well-constructed surface thermometer, but the difference is not so great as might have been expected. When the skin and thermometer are protected by a thick woollen fabric or, better still, by a waterproof covering, the difference may be less than $1^{\circ}\text{C}.$; generally, however, the difference is distinctly greater.

In the experiments summarized in Table II, the two feet of the same person were used for comparative preliminary tests. To each foot the bulb of one recording thermometer was fixed as previously explained, each foot was then covered with a thick woollen sock. In addition to this, a thin oil-silk bag was drawn over the right foot outside the sock. Outer socks and boots were then put on and laced fairly tightly. During the first part of the experiment the temperature of the skin on the inner aspect of both ankles was taken by means of two accurate surface thermometers.

This set of experiments shows that the thermometric method adopted in this investigation is capable of yielding useful and comparable results. It also shows that the imprisonment of a thin layer of air under a waterproof covering reduces materially the loss of heat, even when the external medium is air at a temperature of $14^{\circ}\text{C}.$

TABLE II.—TEMPERATURE OF THE SKIN OF THE ANKLES AFTER MODERATE EXERCISE, BOTH FEET COVERED WITH SOCK AND BOOT, THERE BEING IN ADDITION AN OIL-SILK BAG OVER THE SOCK OF THE RIGHT FOOT. TEMPERATURE OF THE AIR 14° C.

	Time from beginning of experiment	RIGHT FOOT (covered with oil-silk)		LEFT FOOT (not covered with oil-silk)	
		Temperature indicated by :		Temperature indicated by :	
		Recording thermometer	Surface thermometer	Recording thermometer	Surface thermometer
	Minutes	Deg. C.	Deg. C.	Deg. C.	Deg. C.
(1) Thermometers fixed to skin. Socks put on both feet, oil-silk on right foot, both boots laced tightly	0	14.0	..	14.0	..
	3.75	29.0	..	25.0	..
	7.50	31.0	..	27.0	..
	10.25	32.0	..	28.0	..
	15.00	32.0	33.0	28.0	30.0
	18.75	32.0	..	28.0	..
	22.50	32.1	..	28.0	..
(2) Boots removed and both feet in socks placed on floor. (Temperature of floor about 12° C.)	26.25	32.1	..	27.8	..
	30.00	32.2	..	27.9	..
	37.50	32.0	..	27.8	..
	45.00	32.0	..	27.3	..
(3) Heels brought together to protect external surface of thermometer.	52.50	32.0	..	28.5	..
	60.00	32.1	..	29.3	..
	63.75	32.1	..	29.4	..
(4) Heels separated	66.30	32.0	..	28.0	..
<i>Controls—</i>					
Bulbs exposed to air at beginning of experiment	..	14.3	..	14.2	..
Bulbs plunged together in same beaker of water at the end of the experiment	..	16.0	..	16.1	..
Bulbs exposed again to air after the end of the experiment (for $\frac{1}{2}$ hour)	..	14.2	..	14.2	..

Third Set of Experiments. Cooling of the Hands and Feet by Immersion in Cold Water.

(A) *Immersion in a Limited Amount of Cold Water.*—The bulb of a recording thermometer was clasped in one hand so as to establish as complete a contact as possible between the bulb and the skin of the palm and fingers (fig. 4). As soon as the temperature indicated had reached 30° C. the hand and wrist were plunged into a vessel containing 1,200 c.c. of melted ice water so as to cause a displacement of 600 c.c. of cold water. The bulk of the part immersed was, therefore, one half of that of the cold water. In the same vessel the bulb of another recording thermometer was fixed in a position parallel to, and corresponding exactly in height with, that of the bulb held in the hand. Between the hand and the bulb of this second thermometer a glass screen

was interposed to prevent transmission of the heat of the hand to the bulb of the second thermometer by direct conduction. A standard mercury thermometer was placed by the side of the second recording thermometer so that its bulb was opposite the middle part of the bulb of the recording instrument.

By this arrangement, it was possible to ascertain both by the temperature of the hand and by that of the water how much heat had been lost by the hand after various periods of exposure. To eliminate the error caused by the transmission of heat from the surrounding air, immediately after the last experiment, the changes of temperature taking place in the same amount of ice water contained in the same vessel, exposed to air at the same temperature, were recorded by means of the same recording thermometer.

TABLE III.—COOLING OF THE SKIN OF THE HAND AND WRIST (VOL. 600 C.C.) CAUSED BY IMMERSION IN ICE WATER (VOL. 1,200 C.C.) AND CONCOMITANT WARMING OF THE WATER. TEMPERATURE OF THE AIR, 16.5° C.

Time from the beginning of the experiment	TEMPERATURE INDICATED BY THE RECORDING THERMOMETERS		
	Hand Thermometer B*	Ice water with hand immersed Thermometer A†	Ice water without hand‡ Thermometer A
Minutes	Deg. C.	Deg. C.	Dez. C.
0	30.0	0.0	0.0
3.75	11.0	0.5	0.2
7.50	8.5	3.5	0.4
11.25	7.5	5.5	0.6
15.00	9.0	7.0	0.9
18.75	9.8	8.5	1.1
22.50	10.9	9.5	1.4
26.25	11.5	10.5	1.7
30.00	12.5	11.5	2.0
33.75	13.5	12.2	2.2
37.50	13.9	13.1	2.4
41.25	14.8	13.9	2.7
45.00	15.0	14.4	3.0
48.75	15.8	15.0	3.2
52.50	16.6	15.5	3.5
56.25	17.4	16.0	3.8
60.00	18.2	16.7	4.0
0 to 60	Temperature of the air indicated by the recording thermometers		
	15.5	16.2	16.2

Temperature of the air indicated by standard mercury thermometer, 16.5° C.

* The temperatures indicated by Thermometer B were 1° lower than those indicated by the standard thermometer.

† The temperatures indicated by Thermometer A were 0.3° lower than those indicated by the standard thermometer.

‡ This experiment was conducted immediately after the other two. The same quantity of water and the same vessel were used.

STATE OF THE HAND DURING THE EXPERIMENT (TABLE III).

Time after beginning of experiment.		
Minutes		
		Hand, moderately warm, plunged into water.
1	..	Feeling of intense cold, becoming painful in less than 1 minute.
3	..	Pain very marked in metatarsal region of thumb and little finger (dorsal part).
4	..	Tips of thumb and little finger numbed and painful (most exposed parts). Palmar aspect of hand and fingers comfortable. Skin red.
5	..	Numbness and partial loss of sensation in tips of fingers.
7	..	Whole hand numbed, more specially the back. Rubbing of skin with a hard body produces local neuralgic pains. The skin is purplish red and is the seat of dull tingling feelings.
9	..	Well-marked loss of sensation. Shooting neuralgic pains in hand. Sensation of cold extends to the elbow. The skin of the arm feels cold to the touch. The sensation of cold is increased when the hand is moved in the water.
10	..	Slight but distinct lividity of skin.
15	..	Hand still numb, but less painful. Sensation still reduced. Tingling sensation less marked. Skin still livid. Sensation of cold increased when hand is moved.
20	..	Hand feels cold, but comfortable. Numbness slight, skin red, slightly livid.
30	..	Hand feels comfortable, but tingling as after a cold bath. Skin still slightly livid.
34	..	Hand quite comfortable, but feeling alternately cold and warm, except when moving, when it feels cold. Colour normal.
42	..	Skin mottled, pleasantly cool.
54	..	Skin slightly cyanotic again.
60	..	Hand feels almost normal and movements in water are not associated with marked sensation of cold.

The meaning of the figures given in Table III is made very clear by Diagram II.

In the case of the person experimented upon, the temperature of the hand introduced into double its own volume of water at 0° C. fell in about ten minutes from 31° C to 7·5° C., the greater part of the fall (16° C.) taking place during the first four minutes. From the tenth to the sixtieth minute, the temperature of the skin of the hand rose from 7·5° C. to 18·2° C. and was still rising when the experiment was interrupted. While the skin of the hand was losing heat, the temperature of the water was rising, at first rapidly and then more gradually. As the thermometer held in the hand indicated only a temperature intermediate between that of the skin and that of the water having access to the bulb, the readings of that thermometer do not indicate the actual loss of heat. The loss is shown more clearly by the temperature of the water, and if account is taken of the transmission of heat from the surrounding air to the water and of the heat lost by the water owing to evaporation from its surface and of the dew

covering the glass, an approximate estimate can be made of the heat actually lost by the hand and of the amount which must be brought to it by the circulating fluids in order to compensate for the loss and to supply the heat necessary to bring the temperature of the skin back to the normal.

By excluding the heat derived from the air (but taking no account of the loss of heat caused by evaporation), it was found that in sixty minutes the hand had given off enough heat to cause a rise of 12° C. in the temperature of the water. In other words, the temperature of 1 c.c. of water had been caused to rise 0.2° C. per minute by each half cubic centimetre of hand. These estimates are not sufficiently accurate to justify their being used as a basis of elaborate mathematical deductions; they give, however, a very clear indication of the enormous losses of heat which are incurred when a part of the body is immersed in cold water.

The sensations produced in the hand and the appearances of the skin which are recorded in the table showed that when the temperature of the skin was rapidly lowered, pain, numbness and partial loss of sensation were noticeable in less than three minutes, i.e., before the temperature indicated by the hand thermometer had fallen below 12° C. There was also clear evidence of reduction in the flow of blood and of partial stasis in the small veins (as indicated by the cyanotic appearance of the part). The skin did not feel or look quite normal till the temperature indicated by the hand thermometer had risen again to about 19° C., which under the conditions of the experiment required about one hour.

In another experiment conducted nearly in the same way as the last, the effect of immersion in melted ice water upon the two hands was tested simultaneously. In this experiment the volume of ice water used was exactly the same as that of the immersed portion of the hand and wrist (five hundred cubic centimetres).

Immediately before the experiment the left hand had been immersed for fifteen minutes in water at the same temperature as that of the skin (34.25° C.), so that when the hand holding the thermometer was immersed in the warm water no change of temperature was observable.

The temperature of the water in the vessels corresponding to each hand is shown in Table IIIA.

In this experiment the loss of heat from the hand of which the skin had previously been soaked in water was, during the first two minutes, more rapid than that from the hand with a dry skin, after which the reverse took place. The initial greater loss of heat

from the soaked skin can be explained by the increased thermo-conductivity of the skin due to the penetration of some water into the superficial strata of the epidermis. The reversal in the rate of heat exchanges observed after 2.5 minutes is in all probability attributable to the contraction of the terminal arteries, being more lasting in the wet hand than in the dry hand. This view is supported by the great differences in the sensations noticed in the two hands during the first one or two minutes of the experiment and the obvious effects of the cooling upon the cutaneous circulation.

TABLE IIIA.

REMARKS		Time	INDICATED TEMPERATURE	
Left hand, warm and wet. Temperature 34.2° C.	Right hand, warm and dry. Temperature 34.6° C.		Water of vessel con- taining soaked left hand	Water of vessel con- taining dry right hand
		Minutes	Deg. C.	Deg. C.
Plunged into ice water. Immediate and painful sensation of intense cold	Plunged into ice water. Cold sensation not un- pleasant	0	4.4	4.7
Sensation of cramps ..	..	0.5	..	..
Aching all over. Partial loss of sensation	Feeling of intense cold, distinctly uncomfort- able	1.0	..	..
Little finger quite numb	Cramp feeling coming on, no numbness	1.5	..	..
Very painful	Not so painful as left hand	2.5	14.0	13.2
		3.5	14.2	14.7
Hand less uncomfortable, sensation of cold less marked	Less uncomfortable, sen- sation of cold less marked	4.0	..	..
		4.5	14.3	15.0
Removed from water ..	Removed from water	5.0	14.5	15.0

(B) *Immersion in an Unlimited Amount of Cold Water of the Foot protected by a Woollen Sock.*—In the preliminary note which was communicated to the *Lancet* on January 26 of this year (*Lancet*, 1915, i, p. 271), I have briefly described the effects of plunging the foot, protected only by a woollen sock, into a mixture of ice and water, and also into a mixture of ice, salt and water. In both cases, as long as any ice remained in the fluid the average temperature of the mass of water surrounding the foot was not liable to a general rise. The layer of water imprisoned by the

sock round the foot was warmer than the water outside, and this reduced the rapidity of exchanges, except when the foot was moved freely or the surrounding water stirred actively. The method and apparatus used in these experiments were the same as those described in connexion with the second set.

The following tables supply some information not given in the preliminary communication.

TABLE IV.—FIRST EXPERIMENT. COOLING OF A FOOT PROTECTED BY AN ORDINARY WOOLLEN SOCK AND IMMERSSED IN WATER TO WHICH ICE IS ADDED AT INTERVALS. TEMPERATURE OF THE AIR, 12° C.

Remarks	Time	TEMPERATURE INDICATED	
		Skin	Water
	Minutes	Deg. C.	Deg. C.
Foot moderately warm, plunged into luke-warm water. Ice added freely to the water	0	26·0	20·0
	3·75	18·0	..
	7·5	17·0	..
More ice added and water well stirred up	11·25	16·8	..
	15·0	14·0	..
Foot removed on account of discomfort	20·0	12·0	6·0

The foot at the end of this exposure felt cold and numb, the movements were difficult, the skin was very pale and cold to the touch.

TABLE IV (*continued*).—SECOND EXPERIMENT. COOLING OF A FOOT PROTECTED BY AN ORDINARY WOOLLEN SOCK AND IMMERSSED IN WATER TO WHICH ICE AND SALT ARE ADDED. TEMPERATURE OF THE AIR 11° C.

Remarks	Time	TEMPERATURE INDICATED	
		Skin	Water
	Minutes	Deg. C.	Deg. C.
Foot plunged into luke-warm water ..	0·0	26·0	20·0
	3·75	22·0	..
Ice and salt freely added to the water and well stirred up	7·5	22·0	..
	11·25	19·5	..
	15·0	10·5	..
Foot painful and removed from the cold water	19·0*	6·0	0·0

* Owing to a mistake made in copying the records of these two experiments, the times given in the preliminary communication were respectively 45 minutes and 30 minutes, instead of 20 minutes and 19 minutes, which are the exact times.

The foot felt very cold and numb, movements were difficult and any attempt at moving the toes was followed by painful cramps.

In a *third experiment* of the same kind, the foot was placed with no other protection than a wet woollen sock into a refrigerating mixture of ice and salt, the temperature of which was between -3°C. and -2°C. At the beginning the temperature of the skin as indicated by the skin thermometer was 16°C. , and the skin felt cold. The air of the room was at 8°C. The first effect produced was one of intense coldness, not very different from a burning sensation, and was distinctly painful. In about two minutes the temperature indicated by the skin thermometer fell down to 4°C. At that moment the foot was removed because the toes had become paralysed and movements at the ankle had become difficult. There was complete loss of sensation in the skin of the toes and greater part of the foot. The skin was very pale and felt ice cold to the touch. The muscular sense and the power of motion were partly regained after two minutes of active treatment by friction and passive movements. After two more minutes there was considerable cutaneous hyperæmia, sensations of burning and of pins and needles; the indicated skin temperature was then 11°C. The skin still felt very cold to the touch. In a few more minutes the congestion subsided gradually. The temperature of the skin had risen to 20°C. , and the foot felt comfortable twenty-two minutes after removal from the freezing mixture.

In this experiment I had attempted to produce as near as seemed safe the early stages of frost-bite. The difference in the results of this and of the previous experiments is only a matter of degree. The symptoms were all of the same kind and if exposure of the hand or foot to an *unlimited* amount of water at a temperature under $+6^{\circ}\text{C.}$ had been continued for a sufficient time, the hand and foot would have suffered, and in all probability the symptoms would have been more painful because the loss of sensation would have been more gradual. The circulatory disorders would also have been more complex.

The mechanical damage which actual freezing of the tissues is capable of producing appears to be the only thing specially connected with exposure to temperatures below the freezing point as compared with exposure to low temperatures above 0°C.

The following experiment was made nearly six months after those recorded above, during a hot summer's day, and is of interest in showing the influence which the general heat of the body has upon the changes of temperature of a part immersed in melted ice water.

The experiment was conducted in the same way as the previous ones.

TABLE V.—EFFECT OF IMMERSION OF THE FOOT IN ICE-COLD WATER, WHEN THE FOOT, THE BODY, AND THE AIR ARE WARM. TEMPERATURE OF THE AIR 20° C.

Remarks (See Diagram IIIr and Fig. 5a, 7 to 12)	Time from beginning	TEMPERATURE INDICATED	
		Skin	Salt water and ice
	Minutes	Deg. C.	Deg. C.
A.—Foot covered only with a woollen sock, feels warm. It is plunged into the melted ice water	0	26·5	— 1
Immediate feeling of intense cold. Toes are easily moved but become painful, cramp in big toe	1·0	12·0	..
Movements of toes still possible, big toe very painful, cramp in sole of foot	2·0	10·0	..
Movements of toes difficult and retarded, not distinctly felt. Ankle movements easy	2·5	..	..
Considerable loss of sensation in skin of toes; foot less painful. The bulb of the thermometer pressed against the skin produces alternate sensations of heat and cold	3·5	7·0	..
The whole foot is numbed. Tingling sensations in skin of dorsum of foot. Movements still possible, pain diminished. No cramp	5·5	..	..
Great increase of numbness. Anæsthesia almost complete. The foot feels like a weight hanging to the leg	7·5	1·0	..
B.—Foot taken out of water, sock removed, skin purplish red, sensations very imperfect			
Feeling of warmth returning, but the sensitiveness still much reduced. The skin is very red	9·0	..	..
Skin feels still cold to the touch but subjective sensations are almost normal again and the redness is disappearing	11·0	..	..
	13·0	15·0	— 1
Skin feels very hot, and is distinctly redder than normal. There is still some numbness and difficulty of movements	16·0	..	..

The time taken for the foot to reach a dangerous state was in this experiment at least three times greater than in the third experiment when the body, the foot and the air were cold. The recovery, on the contrary, was more rapid.

Fourth Set of Experiments. Actual Protection against the Effects of Immersion in Cold Water afforded by a Waterproof Covering and a Layer of Dry or Damp Air between the Waterproof Covering and the Skin.

The three short experiments recorded in my preliminary communication of last January belong to this group. These experiments were conducted in the same way as those belonging to the second set, but the foot protected by a sock and a bag of oil-silk was immersed in cold water instead of being exposed to air only. The foot was also in some experiments covered by an additional sock outside the oil-silk bag, and occasionally a boot was worn also.

TABLE VI.—FOOT PROTECTED BY A DRY WOOLLEN SOCK AND AN OIL-SILK BAG COVERED EXTERNALLY BY A SECOND SOCK.

Remarks.	Time from moment of immersion	INDICATED TEMPERATURE	
		Skin	Water

A.—Foot plunged into Water to which Ice and Salt are gradually added. (Diagram IIIc.)

	Minutes	Deg. C.	Deg. C.
Foot plunged into water to which ice and salt are added	0·0	+ 24·5	+ 14·0
	7·5	+ 24·0	+ 4·0
Foot quite comfortable and warm. The slight variations of temperature were due to occasional slight movements of the foot which otherwise was kept as still as possible. At the end of the experiment the skin was slightly moist, and there was a slight amount of condensation on the inner aspect of the oil-silk bag. The sock felt quite dry	15·0	+ 24·2	+ 2·5
	22·5	+ 24·2	— 2·0
	30·0	+ 24·3	— 2·0
	37·5	+ 23·9	— 2·0
	45·0	+ 24·0	— 2·0

B.—Foot plunged suddenly into a Refrigerating Mixture. (Diagram IIIb, Fig. 5a.)

Foot plunged into refrigerating mixture, sensation of coolness	0·0	+ 30·0	— 2·0
	7·5	+ 26·2	..
The foot feels moderately warm and comfortable	15·0	+ 24·8	..
	22·5	+ 25·2	..
	30·0	+ 26·0	..
	37·5	+ 25·5	..
	45·0	+ 25·7	..
	52·5	+ 25·6	..
At the end of this experiment the foot was quite comfortable and everything was in the same state as in the previous experiment	60·0	+ 25·6	..
	67·5	+ 25·6	— 2·0

The hand was several times used, more specially for the purpose of testing the effect of a more or less extensive wetting of the woollen fabric worn next to the skin and inside the oil-silk bag.

TABLE VII.—FOOT COVERED BY A DAMP OR WET SOCK AND AN OIL-SILK BAG, COVERED EXTERNALLY BY A SECOND SOCK.

Remarks	Time from moment of immersion	INDICATED TEMPERATURE	
		Skin	Water
A.— <i>Dampness of Inner Sock due to Penetration of Water through a defective Oil-silk Bag.</i> (Temperature of the air, 12° C.)			
	Minutes	Deg. C.	Deg. C.
Foot plunged into the water. Ice added gradually to the water	0·0	26·0	+ 20·0
This experiment was interrupted because the leakage had increased suddenly. The foot was becoming rapidly colder, but was still comfortable.	7·5	24·0	..
	15·0	23·8	..
	22·5	23·0	+ 7·0
B.— <i>Dampness of Inner Sock due to considerable Wetting of the Sole only of the Inner Sock; the Oil-silk Bag was in good Condition.</i> (Temperature of the air, 8° C.) (Diagram IIIc.)			
Foot plunged into the refrigerating mixture	0·0	24·0	— 1·0
	7·5	23·0	— 2·0
	15·0	22·5	— 3·1
	22·5	22·0	— 1·0
The irregularities in the temperature of the water were due to the stirring of the water by the foot, which was moved frequently. This also affected the temperature indicated by the skin thermometer. If the foot had been still, the fall of the skin temperature would have been slower. At the end of the experiment the foot felt cold, but was not numbed. Movements were easy. There was no appreciable loss of sensation. Owing to the low temperature of the air and want of general exercise, the body felt generally cold.	30·0	21·0	— 3·0
	37·5	20·2	— 2·4
	45·0	19·8	— 2·1
	52·5	19·0	— 2·0
	60·0	18·5	— 1·9
	67·5	17·8	— 1·8
	70·0	17·5	— 2·0
C.— <i>Inner Sock quite wet. Heavy Boot worn over Outer Sock.</i> (Temperature of the air 20° C.) (Diagram IIIb.)			
Foot feeling quite warm plunged into refrigerating mixture	0	32·0	0
	7·5	28·0	..
	15·0	26·0	..
	22·5	25·2	..
	30·0	25·0	..
	37·5	24·2	..
Between the 60th and 67th minutes, the ice mixture was thoroughly stirred and made cooler by the addition of more ice and salt	45·0	24·0	..
	52·5	23·4	..
	60·0	22·5	..
	67·5	21·5	— 1
	75·0	20·0	..
	82·5	19·0	..
At the end of this experiment the foot was wet and cold to the touch. It was slightly redder than normal, but the movements were easy. There was no numbness, and the foot was comfortable but for the sensation of coldness	90·0	17·8	..
	97·5	16·1	..
	105·0	16·0	— 1

Figs. 2 and 3 will make clear the arrangements in a foot experiment, and fig. 4 in a hand experiment.

Sometimes the foot or hand was plunged directly into the refrigerating mixture; at other times, the part was immersed in lukewarm water and ice or ice and salt were added to the water, the excess of water being removed from time to time until the required temperature was obtained.

TABLE VIII.—HAND PROTECTED BY A SOCK AND OIL-SILK BAG ONLY.
TEMPERATURE OF THE AIR 15° C. (Diagram IIIA, A₁, A₂.)

Remarks	Time from moment of immersion	INDICATED TEMPERATURE	
		Skin	Water
A.—Dry Sock.			
Left hand plunged into the refrigerat- ing mixture	Minutes	Deg. C.	Deg. C.
	0.0	30.0	— 3.0
	7.5	30.0	— 2.4
	15.0	30.0	— 2.0
	22.5	30.0	— 2.0
	30.0	30.0	— 2.0
	31.5	30.5	— 1.9
B.—Wet Sock.			
Water at 35° C. poured into the oil-silk bag so as to wet thoroughly the sock. Sensation of great cold almost immediate	0.0	30.5	— 1.9
	2.0	15.0	..
	7.5	7.0	— 1.7
	15.0	5.0	+ 0.2

C.—Time taken by the Cold Left Hand to warm the Bulb of the Recording Thermometer so as to cause a Rise of 10° in the Temperature of the Bulb, compared with the Time taken by the Warm Right Hand to produce the same Effect.

Remarks	Time after end of experiment B.	Rise of temperature	Left hand	Right hand
	Minutes	Deg. C.	Minutes	Minutes
Bulb of the thermometer held in each hand so as to exclude access of air as far as practicable	13	18—28	8.6	4.75
	20	20—30	7.5	5.00

Owing to the inconvenience of using the observer's foot in experiments more complicated than those previously described in this section, the hand was utilized to study the effects of soaking the protecting coverings with water.

The hand experiments were conducted exactly in the same way as the foot experiments. The hand, holding the bulb of the thermometer in the manner shown in fig. 4, was covered with one of the dry socks used in the foot experiments, a small

oil-silk bag was drawn over this. No other covering was added. The wrist and part of the forearm were also covered by the sock and bag. As soon as the recording thermometer indicated a fixed temperature, the hand was plunged into sixteen hundred cubic centimetres of a mixture of ice and salt water, the temperature of which was indicated by a second recording thermometer. To ascertain more exactly the effects of complete wetting of the hand and sock, a sufficient amount of water at 35° C. (temperature of the skin of the hand as indicated by a good surface thermometer) was poured into the oil-silk bag so as to wet thoroughly the sock and hand. This was followed by a rapid lowering of temperature and the usual effects of rapid refrigeration of the skin.

TABLE IX.—TEMPERATURE OF THE HAND PROTECTED BY A DRY SOCK AND OIL-SILK BAG WHEN THE PROTECTED HAND IS SURROUNDED: A, BY WATER AT 0° C.; B, BY AIR AT 15° TO 16° C.

Remarks	Time	TEMPERATURE INDICATED	
		Skin	Water
	Minutes	Deg. C.	Deg. C.
A.— <i>Hand in Water at 0° C.</i> —			
Preliminary observations. Hand covered by woollen sock and oil-silk bag plunged into ice water	0·0	34·0 (about)	0·0
	7·5	32·0	0·0
	15·0	33·0	+ 1·5
	30·0	33·2	3·8
B.— <i>Hand in Air at 15° to 16° C.</i> —			
Hand removed from water, sock and oil-silk bag left on	45·0	33·2	6·0
	60·0	34·5	6·5
Oil-silk bag and sock removed, hand bare but bulb of thermometer held as before	67·5	34·5	..
	75·0	34·1	7·3
	79·0	34·0	7·5

[Footnote.— In order to save myself the annoyance of any correspondence with certain well-meaning but troublesome persons, I deem it desirable to state that none of the experiments recorded in this paper were made on hospital patients or soldiers. They, as well as many others, were performed on myself.]

In a third group of this sort of experiments an estimate was made of the time taken for the refrigerated hand to cause a rise of 10° C. in the temperature of the metallic bulb of one of the recording thermometers. This was compared with the time taken by the hand which had not been refrigerated to produce the same result.

These observations are summarized in Table VIII.

SUMMARY OF EXPERIMENTAL RESULTS.

Within the range of temperature and the period of time covered by the experiments referred to in the previous parts of this paper, the effects of exposure of the extremities of a healthy elderly adult to external media colder than the skin, were found to be widely different according to circumstances. (See Diagram III.)

(1) The lowering of temperature caused by exposure to cold dry air was slight and not progressive. The loss of heat was obviously compensated by the heat yielded by the tissues and the circulating blood.

(2) The lowering of temperature caused by immersion in a limited amount of water was rapid and considerable, but not permanent. When the bulk of the water did not exceed twice that of the part immersed, enough heat was yielded by the tissues and circulating blood to warm the water to a temperature which was not detrimental to the part.

(3) The lowering of temperature caused by immersion in (a) an unlimited amount of water at a temperature below that of the skin or (b) water (in limited or unlimited quantity) containing ice, was very rapid, considerable and progressive. A pathological state, *local frigoris*, was invariably the result. This state was characterized by contraction of small arteries, more or less complete arrest of flow of blood, various degrees of anæmia or passive hyperæmia (cyanosis of part), irritation of terminal nerves followed by nervous and muscular paralysis.

(4) Motion of the external fluid medium prevented the formation of a comparatively warm layer of fluid near the surface of the skin and accelerated the loss of heat.

The presence of a thick woollen covering retarded the loss of heat, even when the covered part was plunged into water, owing to the warming of the comparatively still layer of water retained within the meshes of the woollen fabric.

(5) A very thin layer of moderately dry air between the skin and a cold external medium, such as water or ice, was sufficient to reduce the loss of heat to such an extent that the amount of heat brought to the part by the circulating blood was sufficient to compensate for the loss.

(6) A very thin waterproof covering, used in combination with a woollen covering, was found sufficient to secure an efficient air covering for the skin.

(7) The presence of some moisture and even of a moderate

amount of water under the waterproof covering, reduced the efficiency of the waterproof covering but did not render it useless.

PART II.

PROTECTION OF SOLDIERS AGAINST FROST-BITE AND OTHER EFFECTS OF EXPOSURE TO COLD (LOCAL FRIGORISM) FROM A PRACTICAL POINT OF VIEW.

Adequate feeding, perfect circulation, moderate muscular exercise, good general health, warm clothing, all tend to give to the body its maximum power of resistance to cold. It is obvious that anything that tends to impair the nutrition and activity of the tissues and to interfere with the freedom of circulation, is favourable to the occurrence of frigorism. Tightness of the clothing of the extremities, e.g., tight boots, leggings, etc., is particularly detrimental. Heavy clothing and other equipment, by increasing fatigue, has also a predisposing influence.

Warm clothing does not mean heavy and thick garments, but clothes capable of keeping imprisoned near the surface of the body a fairly thick layer of air. It is generally recognized that several layers of light woollen or other fabrics form a particularly efficient protection against cold air when the air is not in a state of rapid motion. Common experience has also shown that a layer, however thin, of some material impervious to wind, worn outside ordinary clothing, is the most efficient protection against cold draughts and winds. Paper, mackintosh, skins, closely woven fabrics worn outside ordinary clothes, have all been extensively used for this purpose.

With regard to protection against cold water, it is necessary that the external covering should be impervious to and not affected by water. India-rubber stockings, waders, and boots have been used extensively by anglers and men working in water and mud, not only as a protection against wet but also against cold. For the same reason sailors and other men have had resort to oilskin.

The experiments recorded in the first part of this paper indicate clearly how these impervious coverings act.

When at the beginning of the winter a large number of soldiers were invalidated owing to the effects of exposure to cold, there must have been some reason why these well-known methods of protection had not been taken advantage of. On consideration it appeared to me that the main reasons for this neglect were that the articles on the market at the time were too heavy, too cumber-

some, too expensive, too perishable, and generally incapable of being adapted to the present requirements of the soldier.

It is obvious that the india-rubber boots and the waders available at the time were much too heavy and clumsy, and would have seriously interfered with that freedom of movement which is so essential to the soldier. Fishing socks or waders, when sufficiently light and well made, are very expensive. They are fairly thick and occupy much room; they also require frequent repairs. The india-rubber used in their manufacture is liable to become hard and fissured under the influence of cold or even when simply stored for any length of time. India-rubber is also easily softened by fatty substances, vaseline, etc.

It occurred to me that a more suitable article might be made of a thin fabric rendered waterproof by means of boiled linseed oil. Some very fine material is manufactured for the making of transparent waterproof coats, but even if this material had been quite suitable, it was necessary to find the means of making bags without sewn seams, because such seams allow penetration of water to such an extent that my object would have been partly defeated.

After several weeks' trial, I succeeded in manufacturing by simple means, a very thin and soft oil-silk which could be made into absolutely waterproof bags by means of apposition seams. These bags were quite inexpensive.

Having reached this stage, at the end of last January, I submitted my results to Sir Alfred Keogh, who referred the matter to Major Lelean, from whom I received very friendly encouragement.

I had not then quite solved the difficulty connected with the manufacture on a large scale. I was hoping that this difficulty would easily be overcome by some experienced manufacturer of waterproof fabrics, but in this I was disappointed. After a few more trials I was able to simplify the process of manufacture to such an extent that no doubt remained in my mind as to the possibility of producing rapidly at a small cost and on a large scale, oil-silk bags capable of protecting the leg up to the knee or up to the hips.

The same material and method can also be employed for the purpose of manufacturing very light waterproof coverings for various parts of the body, a matter of some importance since the protection of the body as a whole against losses of heat is of great value in increasing the resistance of any part of the body against local frigorisism.

RESULTS OF SOME OF THE TESTS TO WHICH THE OIL-SILK BAGS
HAVE BEEN SUBMITTED.

The *weight* of a pair of leg bags capable of protecting the legs up to the knee varies from 95 to 120 grm. (under 4 oz.).

Strength and Durability.—Each bag held by a narrow clamp can hold water up to a height of 15 to 20 in. (weight of water 7 to 10 lb.) for forty-eight hours without suffering any damage and without any of the water escaping.

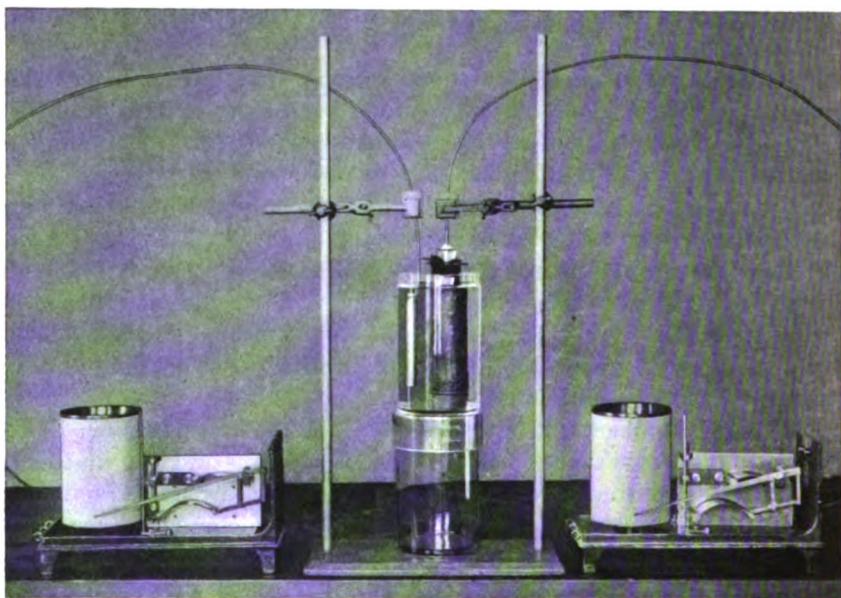


FIG. 1.

Apparatus used in the experiments on the cooling of 50 c.c. of water; including the two recording thermometers. (See Diagram I, and p. 403.)

After the bags have been worn round the foot and leg and walked with for many hours, a slight oozing of water may take place in the region of some folds where the friction has been greatest. This, however, does not diminish considerably the efficiency of the bags, and if each time after they have been worn for many hours, they are flattened, a thin coat of a mixture of boiled linseed oil and turpentine spread over them and allowed to dry in the air (preferably of a warm room), their waterproofness is quite restored. This indicates the desirability of two pairs of bags

being available for each man. Accidental tears and holes are easily repaired.

Resistance to Chemical and Physical Agents.—Neither immersion in ice-cold water nor in boiling water causes any damage to the material or to the seams.

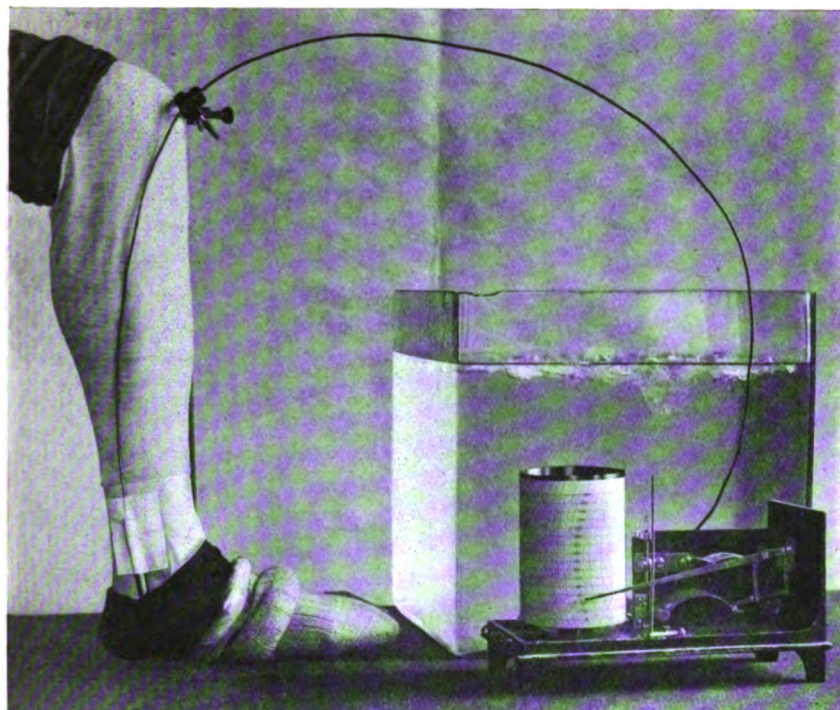


FIG. 2.

Disposition of the foot and recording thermometer in one of the foot experiments. On the left the inner sock, oil-silk bag, and outer sock have been rolled back so as to expose the bulb of the thermometer pressed against the skin behind the inner malleolus. Part of the india-rubber plaster, employed to fix the bulb to the skin, has been removed to expose the lower part of the bulb. On the right is seen a Richard recording thermometer, and behind it the glass tank used as foot bath in the experiments. Some of the ice left at the end of one experiment is still visible on the surface of the water. At the beginning, the whole tank was filled with ice, with just enough water to make the introduction of the foot possible. The level of the water rose to a height of 12 to 14 in. up the leg.

The oil-silk may be immersed for twenty-four hours in two per cent nitric, sulphuric, or hydrochloric acid, in one per cent chlorinated lime, perchloride of mercury, iodine, carbolic acid, Izal solutions, etc., without suffering any appreciable deterioration. Long

immersion, however, in two per cent caustic potash or soda, ultimately brings about complete solution. A two per cent solution of soft soap is also ultimately detrimental. The action of soft soap is, however, much slower than that of free alkalis.

Storage.—These bags, tightly rolled, occupy a very small space, and if properly dusted with French chalk they can be kept for

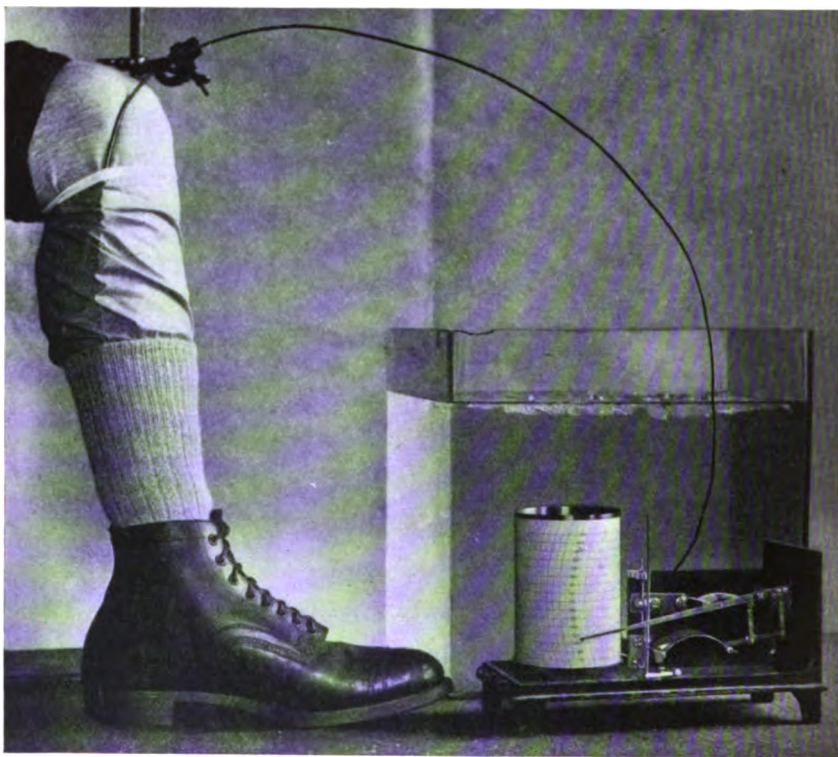


FIG. 3.

Arrangement for a foot experiment with all the coverings (including a boot) in position.

several months without deterioration. Some of these folded bags have been submitted to a pressure of forty pounds for forty-eight hours at a time without suffering any damage.

I have worn a pair of them on several occasions, and taken long walks with them without experiencing any discomfort.

Some bags which I made in March of this year have been submitted to the tests mentioned above. I have worn them with Army boots weighing nearly one kilogramme each, kept them on

continuously for periods of eight hours, twelve hours, and fifteen hours. I have walked in them some twenty-two miles and these bags, after being oiled again as explained above, are quite serviceable and efficient.

The bags were worn over an inner sock and protected by a second outside sock; the boots were *two sizes larger* than my ordinary walking boots.



FIG. 4.

Disposition in hand experiments. Left hand shows the way in which the bulb of the thermometer is held. Right hand shows the sock and oil-silk bag turned back.

I believe that a good firm, prepared to be satisfied with small profits, should be able to make my oil-silk bags for less than 3s. a pair. Such bags should cover the leg up to the knee. Longer bags would not be very much more costly.

The material could be utilized in other ways to protect the legs, feet, and other parts of the body, but the method which I have described has for object to *make it possible for the men to use the boots they are at present provided with and thus save the considerable expenditure necessary to replace entirely that part of their equipment.*

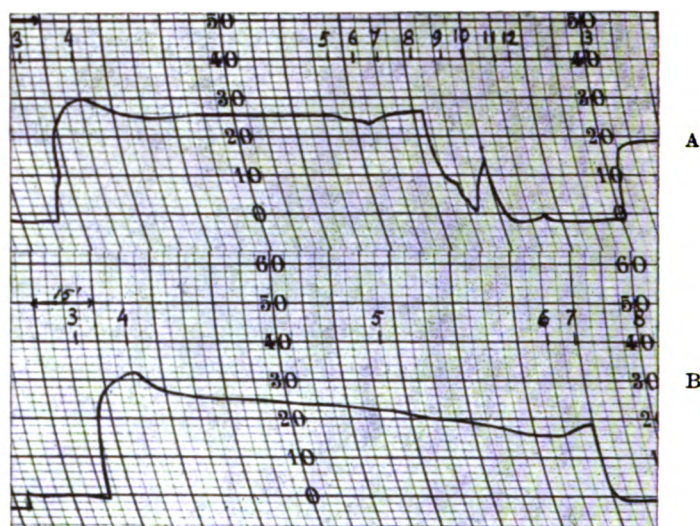


FIG. 5.

Photographs (reduced) of two thermographs taken simultaneously to show the effects of the immersion of the two feet (each foot was protected by an inner sock, oil-silk bag, outer sock, and heavy boot) in a refrigerating mixture at a temperature of about -1°C . In the case of one foot (A) the inner sock was dry (Curve A); the sock over the other foot (B) was damp (Curve B).

Curve A. (4 to 6, see also Table VI B.—7 to 12, see also Table V.)

3. Thermometer fixed to the skin by plaster and bandage; inner sock, oil-silk bag, outer sock, and boot put on rapidly.
4. Foot A plunged into refrigerating mixture.
5. Foot taken out of the refrigerating mixture; boot removed rapidly. Thermometer disturbed.
6. Oil-silk bag removed; thermometer refixed.
7. Foot, covered with inner sock only, left exposed to air at 20°C .
8. Foot, with inner sock only, plunged into refrigerating mixture, which is thoroughly stirred. The slight kink in the curve between 8 and 9 is the result of renewed stirring of the refrigerating mixture.
9. Foot A removed from mixture; sock removed and foot dried.
10. Thermometer separated from the foot and plunged into the refrigerating mixture.
11. About $\frac{1}{2}$ of the thermometer bulb drawn out of the mixture for three minutes.
12. Bulb pushed back into the mixture and completely immersed.
13. Bulb removed from the mixture, dried, and exposed to the air of the room.

(N.B.—In this graph the indicated temperature is a little more than 1°C . lower than that indicated by the mercurial thermometer.)

Curve B. (4 to 6 see also Table VII c.)

- 3 and 4 as in A. 5 indicates the moment when Foot A was removed from the mixture.
6. Foot B removed from mixture. Boot, oil-silk bag, and socks removed, [Foot B. dried and exposed to air at 20°C .
7. Bulb separated from foot and plunged into refrigerating mixture.

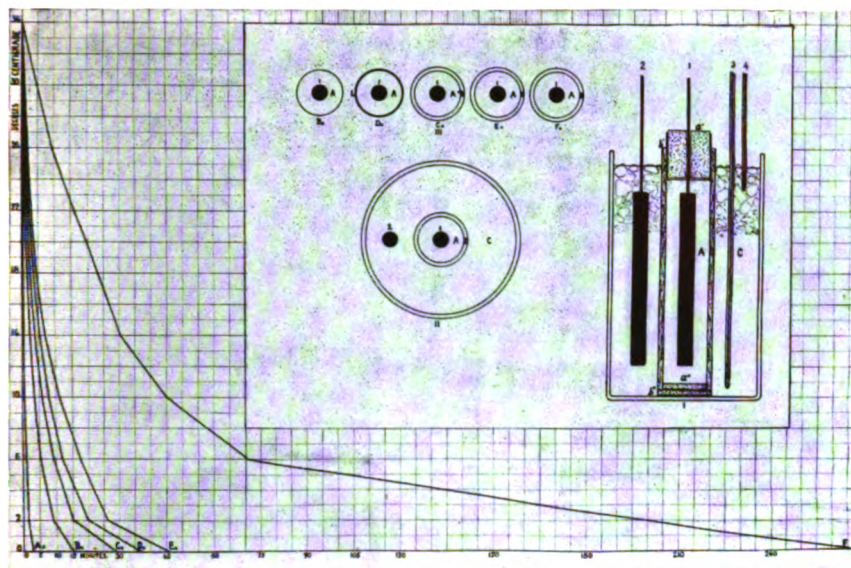


DIAGRAM I.

I. Apparatus used for determining approximately the rate of cooling of 50 c.c. of water contained in an oil-silk cylinder, variously protected, immersed in 1,000 c.c. of melting ice (see Table I).

- A. Cavity of the inner oil-silk cylinder containing the warm water.
- B. Annular space between the inner and the outer oil-silk cylinders. This space was occupied during the various experiments by a loose woollen fabric with dry air, or moist air, or water (see III in same diagram).
- C. Cavity of the glass jar containing ice and water.
 - a' Cork used to close the upper end of the inner oil-silk cylinder.
 - a" Lower end of cylinder, closed by means of a cork.
 - b' Upper end of outer cylinder.
 - b" Lower end of outer cylinder closed by means of a cork.
 - 1. Part of the recording thermometer indicating the temperature of the water in the inner cylinder.
 - 2. Part of the recording thermometer indicating the temperature of the water in the outer cylinder.
 - 3 and 4. Controlling mercurial thermometers.

II. Transverse section of apparatus shown in vertical section in I.

III. Diagrammatic representation of the arrangement of experiments, the results of which are shown in the curves.

Curves.

- Ax. Shows the rate of cooling from 34° C. to 0° C. of the bulb of the recording thermometers used in these experiments.
- Bx. Rate of cooling of water contained in the inner oil-silk bag without any protective covering.
- Dx. Rate of cooling when the inner oil-silk bag is covered only with a uniform layer of lard $1\frac{1}{2}$ mm. thick.

In the following experiments the annular space between the inner and outer oil-silk cylinders was occupied by a loose woollen fabric of uniform thickness:—

- Cx. In addition to the woollen fabric the space was filled with water.
- Ex. In addition to the woollen fabric the space was filled with damp air.
- Fx. In addition to the woollen fabric the space was filled with dry air.

N.B.—From the shape of the curves it seems probable that there were some slight errors of observation or defects in the instruments. No attempt has been made to correct these probable errors.

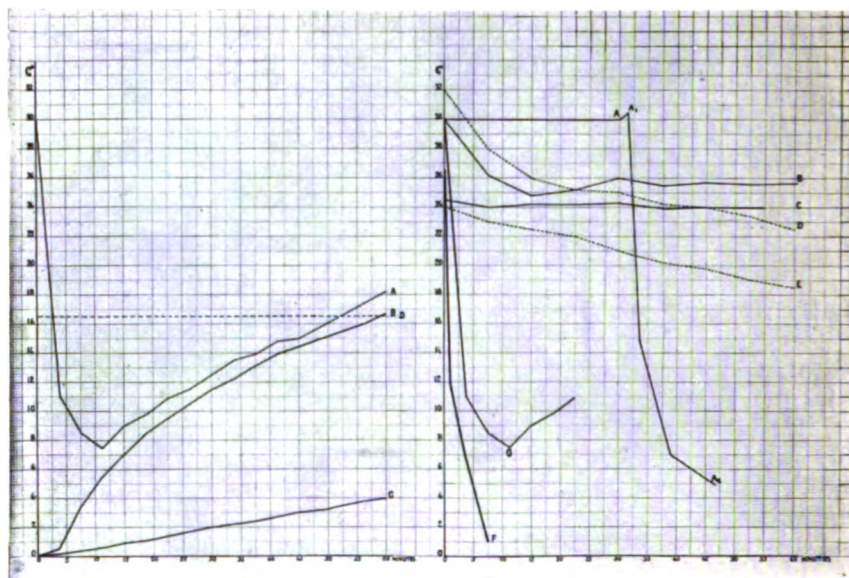


DIAGRAM II.

DIAGRAM III.

DIAGRAM II.

Cooling of the skin of the hand and wrist caused by immersion in ice water and concomitant warming of the water. (See Table III.)

- A. Indicated temperature of the hand immersed in ice water.
- B. Indicated temperature of the limited amount of ice water in which the hand is immersed.
- C. Indicated temperature of the same amount of ice water exposed in the same vessel to the air of the room at the same temperature.
- D. Indicated temperature of the air of the room (dotted line).

(N.B.—The slight irregularities which are observed in Curve C, which should be an even curve, probably indicate the extent of the errors introduced by the recording apparatus. The much greater irregularities in Curve A are probably due to movements of the hand and to vaso-motor phenomena.

DIAGRAM III.

Summarizing the results of some of the chief experiments bearing upon the cooling of the hand or foot immersed in ice water, and upon the effects of protecting the hand or foot by means of oil-silk bags.

- A. Hand protected by dry sock and oil-silk bag.
- A₁. Water at 35° C. poured into the oil-silk bag so as to wet thoroughly the sock. Very slight rise of temperature, followed by very rapid fall A₂. (Compare with F and G.) (See Table VIII.)
- B. Warm foot protected by dry sock and oil-silk bag (Table VIb).
- C. Cold foot protected by dry sock and oil-silk bag (Table VIa).
- D. Warm foot protected by damp and partly wet sock and oil-silk bag (Table VIc).
- E. Cold foot protected by damp and partly wet sock and oil-silk bag (Table VII).
- F. Foot covered only with woollen sock and plunged into refrigerating mixture (Table V.)
- G. Hand unprotected plunged into double its bulk of water at 0° C. (See Diagram IIa.) (For comparison with F and A₁ to A₂.)

HORMONES AND VACCINES.

BY COLONEL R. H. FIRTH.

IF Heberden, Mead, Abernethy and other leading doctors of the comparatively recent past could revisit this world and note the practice of the consulting rooms and hospitals of our day, probably nothing would impress them more than the existence amongst us of what we may call substitution therapy, or the administration of substances in order to either replace or supplement a pathological deficiency. It is well known to all that this therapy is of recent growth, and finds its expression essentially in the administration of the substances called hormones and vaccines. The purport of this article is to review the present position of their therapeutic value.

By hormones, one means the active agents contained in the internal secretions of certain glands, some of which are ductless. The secretion of these glands contains one or more special hormones and there is much which suggests that one hormone differs from another in the particular effect it can produce. That this is the case may be due to the fact that many of the ductless glands consist of two parts, apparently endowed with different functions; well-known examples are the thyroid and parathyroid, the anterior and intermediate lobes of the pituitary, the cortex and medulla of the suprarenals. Similarly, one portion of the ovary, testis and pancreas supplies an external and another portion an internal secretion. In therapeutics, extracts are employed prepared from the whole of the glands, and it is questionable whether we know the exact properties of the hormones supplied by each member or part of the glands, or are employing them otherwise than empirically. The term hormone really means a stimulator of metabolism, but many of the so-called hormones control or even inhibit metabolism. They are thus the chemical means of correlation of the activities of different parts of the body; their action may be either the increase or diminution of function and the alteration of nutrition or rate of growth. A complication arises from the fact that the external secretion of these glands contains different ferments and, just as one ferment such as trypsin under proper conditions can replace another such as pepsin in the digestion of protein, so it is not unreasonable to suppose that one hormone may, to a certain extent, be able to supplement or replace another of similar but not identical properties. Another difficulty is that there is much to suggest that

some of the hormones, like those from the pancreas, are not obtained or administered in a physiologically active condition. In spite of these defects of knowledge, considerable evidence exists that the hormones have a therapeutic value in one or other of the following ways. Their most obvious use is in the treatment of those diseases due to destructive lesions of the gland by which they are secreted; in this true substitution treatment the hormones are obviously used rationally. Again, the hormones are of use when there is a physiological demand for an increased secretion which the glands of the patient are unable to meet, and in this manner we may employ hormones which not only excite but those which restrain functional activity in other organs. Further, the hormones can be used where their known physiological action may be of use quite apart from any defect in activity of the patient's own glands; this constitutes their empirical use.

These various uses are well illustrated by the therapeutic employment of the thyroïdal hormones. Myxœdema is the result of diminution or loss of the normal supply of these hormones in man; yet, by the constant and regulated use of heterogeneous thyroïdal hormones prepared from a lower animal, all the symptoms of myxœdema in man can be removed and do not return as long as an adequate supply of these hormones is maintained. The same may be said of cretinism, provided treatment is commenced early and continued throughout the full period of developmental growth. Similarly, the simple parenchymatous enlargement of the thyroid which occurs in young women is a goitre arising in response to a demand for a greater supply of thyroïdal hormones, but apt to be both excessive and persistent. If the hormones are supplied ready made in the form of one or two five-grain tabloids of thyroïdal extract, the goitre subsides gradually in most cases; on the other hand, early cases of Graves's disease, due to an already too abundant supply of these hormones, are aggravated by this substitution therapy. Again, thyroïdal hormones may be used to stimulate metabolism in the treatment of some forms of obesity, and of certain types of psoriasis; their value is manifest equally in fortifying the resistance of the teeth against caries, in rickets, rheumatoid arthritis, and in nocturnal enuresis. How the hormones act in these cases we cannot explain, but it is probably by stimulating the metabolism of calcium salts.

In dealing with the therapeutic use of the hormones, it is convenient to divide the hormonal actions of the body into two classes, or the acute and the chronic. A typical example of the

former is the mechanism for secretion of the pancreatic juice, where the entry of acid chyme into the duodenum liberates in the cells of the mucous membrane a chemical substance, secretin, which, absorbed by the blood-vessels of the gut, is carried to the pancreas which it excites to secretory activity. Other examples of the same class are the production of adrenalin by the suprarenals under conditions of fright, and the chemical regulation of the activity of the respiratory centre in accordance with the metabolism of the muscles and the production of carbonic acid. Although carbonic acid and adrenalin are being produced constantly in the body, their amount may be increased largely under certain conditions; the production of adrenalin is particularly a beautiful example of refinement of means by Nature for the one great end, namely, the undertaking of active movements for offence or defence. These demand a high blood-pressure, increased blood-flow through the heart, and a mobilization from the liver of the glycogen store of that organ, whereby the muscles are flooded with the food most readily utilized by them to supply the extra energy demanded. By its extraordinary power of raising blood-pressure, adrenalin is the magician which instantaneously initiates these essential factors for sustained effort. Even the clotting of blood by adrenalin is but a further elaboration to check leakage in any chance wound of the body during action; and the very machinery employed to prepare for combative effort may, with the cowardice of civilization and by a curious antithesis of emotions, be set as powerfully in motion only to express fright.

In all these cases it is essential that the reaction take place at once, and cease as soon as the exciting cause is removed. The hormones associated with these reactions must, therefore, be capable of rapid disappearance from the body, either, as in the case of secretin or adrenalin, by oxidative destruction, or, as in the case of carbonic acid, by elimination. Owing to the ready destructibility of both secretin and adrenalin, their employment in a substitution therapy is limited, and their administration by the mouth practically useless. Similarly, their only use is as drugs, because, though we can evoke the physiological action of these substances by introduction into the blood-stream, it is difficult to control or grade their action, as must be the case under normal or natural conditions. Adrenalin we constantly use for its local effects on the blood-vessels; personally, one employs it as an excellent and rapid means of stopping bleeding after a cut during shaving, but it is practically useless to replace the functions of

an absent suprarenal medulla. We know it to be the most efficient cardiac stimulant, but its employment in a case of failing heart is discounted by our inability to dissociate its power of vascular constriction, and increasing the resistance to the blood-stream, from its action on the heart. Although secretin is an infallible excitant of pancreatic secretion it is doubtful whether we can expect good results to follow its use; we need to remember that this alkaline juice enters the duodenum immediately after a certain amount of acid chyme, and the secretion of the pancreatic juice lasts only so long as the duodenal contents are acid. Cases in which secretin has been given to healthy animals have resulted in symptoms of acute collapse produced by the entry and non-neutralization of the highly alkaline pancreatic juice and degradation changes in the intestinal mucous membrane.

When we pass to the second or chronic class of hormonal reactions we find better chances of successful substitution therapy. In this group are the action of the thyroid on nutrition, metabolism, and on the functions of the central nervous system; also, the action of the anterior lobe of the pituitary body on the growth of bone, the action of the sexual glands on the development of secondary sexual characteristics, and the action of the corpus luteum on the growth of the mammary glands. To this list, one might add the apparent influence of the pancreas in regulating carbohydrate metabolism. In them all the chemical product of some organ passes into the blood-stream and exercises a slow or chronic effect upon some distant organ or group of organs. The weakness of our position lies in the fact that we cannot in all cases be sure that there is not a vulnerability of the hormone from the destructive actions of the body juices or of oxidation. This explains why we do not get therapeutic results always by the oral administration of hormone-producing organs in cases of their deficiency. The only certain result has been attained by the administration of the thyroid, and that this is so results from adherence to two conditions which are essential if success is to follow administration by the mouth; these are, that there is a storage of the active substance in the gland, and that the substance is not destroyed in the alimentary canal. In connexion with these essentials is the interesting point that at one period in our evolution the thyroid was a gland opening into the anterior part of the alimentary canal. Unfortunately, all efforts to reproduce the action of the testes, the ovaries or of the corpora lutea, and of the anterior lobe of the pituitary by oral administration or by the subcutaneous injection of extracts have resulted, so far, in failure or indefinite results.

In the case of any gland of internal secretion, it is evidently necessary for the success of substitution therapy that the gland in question must act as a storehouse for the active elements of its secretion, and must hold them in quantity much in excess of the immediate needs of the body. Further, those active elements must be of a relatively high stability, retaining their potency in artificial solution or surviving the death and drying of the parental gland tissue. Again, if there is to be any success from the administration of hormones under the ordinary conditions of practice, their action must be such that the introduction of large doses at long intervals can replace the slow constant secretion, by which we presume they reach the circulation under physiological conditions. In the case of thyroid treatment, we know that these conditions are met, but in respect of the other ductless glands the evidence is in the other direction. Certain hormones, like secretin, adrenalin, and the active constituent of the posterior lobe of the pituitary body are relatively stable substances, but their use is rather as drugs than in the sense of the true substitution therapy; we cannot say they cure, at the most they relieve somewhat the conditions associated with pathological defects of their glands of origin. We know little or nothing of the active principles of the suprarenal cortex and of the anterior pituitary lobe, except that they are not the stable hormones recognizable in the other portions of those glands. It is true that benefits are reported from relatively large doses of ox pituitaries, but the evidence does not warrant our assuming that, either in its power of storage or in the stability and absorbability of its principles, the pituitary gland is in the same class as the thyroid.

The relations of adrenalin to chloroform anæsthesia are of some importance. Direct and careful observations made upon chloroform anæsthesia, produced under conditions militating against exact and scientific methods of administration, show that in fatal cases it is the heart which failed and not the respiration. The factor at work would seem to be ventricular fibrillation, due to an irritable ventricle or ventricle giving rise to frequent extra systoles and sometimes tachycardia. The intimate relation of such to fibrillation suggests that the latter is merely a further advance upon the former. The administration of adrenalin favours both the ventricular irregularities and the onset of fibrillation. The lesson is obvious that chloroform administration is contra-indicated after local adrenalin application. Recent research suggests that this unfavourable action of adrenalin is due to simultaneous stimulation

of the extracardial nerves, the vagus and the sympathetic. The sensitiveness of the vagus to adrenalin appears to be heightened by the chloroform. The cardiac irregularities under chloroform anæsthesia with adrenalin seem to follow a definite plan. It is a plan explainable by synchronous vagal and accelerator stimulation. A remedy is forthcoming by a previous injection of atropine which, by cutting off vagal effects, lessens the liability to cardiac irregularity.

Of all the hormones, adrenalin stands out prominently as having furnished a fascinating chapter in recent physiological literature, and nowhere more than in its effects after acute fevers and diphtheria, when the suprarenals are depleted of their store, does it show itself as essentially a therapeutic substitute. Pituitrin obtained from the pars intermedia or from the posterior lobe of the pituitary body, we must regard as a drug. The clinical results of pituitary atrophy are familiar under the name of adiposo-genital dystrophy; in this rare condition, improvement in the obesity and sexual power has followed treatment with the pituitary extract. The same extract is useless in acromegaly, as this condition is due probably to a hyper-secretion of the gland, though in the later stages there appears to be a failure of pituitary hormones, against which the giving of large doses of the extract affords some relief of symptoms. Recent work indicates the great value of pituitrin as a stimulant of plain muscle, whereon it acts by increasing its sensitiveness to normal stimuli rather than by acting as a direct stimulant. In the normal person, it causes no rise of blood pressure, but in the experimental animal with high blood-pressure may cause a fall; yet, when the vasomotor centre is impaired and the blood-pressure lowered artificially, the tonic effect of pituitary extract on the arteries is great and prolonged. The heart is not affected directly, but, in shock and the anæmia caused by general relaxation of the arteries, the restored tone of the latter following the administration of pituitrin improves the heart-beat. The physiological action of pituitary extract upon the uterus has been beneficial in post-partum hæmorrhage, but many regard it as inferior to ergot. In amenorrhœa and mal-development of the mammæ or backward sexual functioning in young women, the use of the pituitary extract has given good results, while, in those curious and undefined neurotic or neurasthenic conditions of some women, the empirical use of this extract has been known to act as a charm. Again, in cases of pneumonia with low blood-pressure an injection of one cubic centimetre of pituitary extract every six

hours is a resource worth remembering; similarly, it may be of value in tympanites due to paresis of the intestinal muscular coat.

At the present time, the chief interest of pituitrin centres round its action on the uterus, where its therapeutic action appears to depend more on increasing the sensitiveness of that musculature to normal stimuli than on direct stimulation. If the extract be injected during pregnancy it does not induce labour; but when labour has commenced and the normal physiological stimulus is presumably present, but the uterine muscle inert or deficient in response, then pituitary extract intensifies and prolongs the uterine contractions and hastens the completion of the second stage of labour. Current literature indicates that its use has obviated the employment of forceps in many cases, without entailing harm to mother or child. The other defined effects of pituitary extract on the excretion of urine and secretion of milk have not found so far a wide therapeutic field, but as accessories to its other actions in obstetric practice they have an obvious value. Doubts exist as to whether one or more principles are concerned in the activity of the extract, but, from the practical aspect, there is no known method of separating the activities, neither has the presence of any one of them imposed any limit on the use of the extract for the sake of the others. To the hypercritical, the pituitary extract is not a hormone, in that our anatomical knowledge does not support the view that the pituitary body secretes a principle or principles producing its effects upon the circulation during life. Whether it is a hormone or not, the probabilities are all in favour of the view that it is, and it is difficult to explain the presence of such a potent principle in the body on any other assumption; the most we are prepared to admit is that our present ignorance of its nature compels us to use it in therapeutics as a drug rather than as a true hormone.

The hormones produced by the interstitial cells of the ovary and testis have definite physiological actions, but their real use in medicine is still empirical. Symptoms due to the normal climacteric and those induced in a premature climacteric, following removal of both ovaries, have been and are relieved by the administration of ovarian extract. The writer knows also of a case, which may best be termed as one of climacteric in the male, in which curious neurotic symptoms disappeared after a course of testicular extract, called didymin. Since so many of the symptoms in both classes of case are subjective, it is difficult to appraise correctly the effect of any treatment, and it is wiser to suspend judgment as to the

real value of either ovarian or testicular extract. An intimate knowledge of the pathology of diabetes, and a recognition of the part which a loss or deficiency of the internal secretion of the islands of Langerhans in the pancreas play in carbohydrate metabolism suggests that could we obtain the pancreatic hormones in an active form and maintain an active supply of them, we should have a powerful means of controlling cases of pancreatic diabetes. So far, this addition to our therapeutic armament is not available. Enough has been said to show that the use of the hormones of a single gland is complicated, but the questions at issue have been made more difficult by attempts to employ combinations of hormones in the treatment of conditions thought to be due to polyglandular insufficiency. We know too little of the actions and real values of the individual hormones to attempt to dogmatize or prognosticate as to polyglandular therapy, but it is interesting to note that a therapeutic mitrailleuse, called hormotone, and said to contain several active hormones, is on the market and alleged to be successful in the kind of neurasthenic cases referred to as benefiting by pituitary extract. One is tempted to close this section of the article by saying, that while the therapeutic value of thyroidal, suprarenal and pituitary hormones is undoubted, the evidence available as to the other hormones suggests caution or reserve in advocacy of their value in the treatment of disease.

We can now pass to the consideration of the so-called vaccines as therapeutic agents; in respect of this nomenclature, one cannot refrain from the expression of a regret that the term "vaccine" was ever applied to preparations which are neither derived from nor have the remotest connexion with the cow, that classical and familiar beast rightly and honourably associated with the discovery and efficacy of Jennerian vaccination. As the term has passed into current use, one employs it in this article as meaning those preparations or emulsions of killed micro-organisms which, if injected into the body fluids, by virtue of their associated toxins stimulate the formation of antibodies protective or antagonistic to the particular infection in which they are employed. The administration of these preparations constitutes what may be called a specific therapy, in contradistinction to the substitution therapy as typified by the administration of hormones. The evolution of this therapy is recent and of interest, as it marks the intrusion of the skilled bacteriologist into the sphere of clinical medicine and the co-operation between the laboratory and the clinique. The existence and genesis of this particular specific therapy appeals much to us,

as its inception and placing upon a non-empirical plane was the outcome of the work and advocacy of a one-time colleague of the writer's, Sir Almroth Wright, who in the old laboratory at Netley worked laboriously in perfecting technique for the practice of a therapeutic method which, if not giving all the results at one time expected of it, has come to stay and contains much promise of greater development. Like other new methods, vaccine therapy suffered from the over-zeal of its earlier advocates and their failure to appreciate that its value is in direct proportion to the care and judgment bestowed upon the diagnosis of the case in which it was proposed to employ it. The initial error on the part of professional advisers was accentuated by the enthusiasm of the lay public in resorting to and desiring inoculations, an attitude which appeared at one time to have reached almost the belief that the inoculating syringe was the panacea for all ills. The result, for some years at least, was a situation of rampant empiricism which has left a record of vaccine therapy at once unsystematized and unreliable, so much so that it has gone perilously far towards bringing the whole procedure into disrepute. The original inception of Wright and his pupils for the employment of a strictly appropriate or autogenous vaccine was gravely lost sight of and, in the course of time, a supply of stock vaccines was put upon the market by enterprising pharmacutists. Admitting the logic of the inference that there is an actual necessity for stock vaccines in certain cases, in which no material is available for the making of an autogenous vaccine or in which experience makes the nature of the infection highly probable, it follows that stock vaccines, if prepared at all, should be prepared with a view to their being polyvalent, or at least made from a mixture of strains of the particular micro-organism concerned. A later demand has been for substances of more questionable value, and pharmacists now supply stock preparations which, under the name of phylacogens, are mixtures of the endotoxins of several different micro-organisms. The evolution of vaccine therapy has led, therefore, to the production of three grades of the particular reagent emanating from the laboratory; namely, autogenous vaccines, stock vaccines, and phylacogens. There can be little doubt but that these three grades correspond with three degrees of efficiency, and the merits of vaccine therapy as a curative measure rest almost entirely upon the results obtained by the use of the autogenous vaccines prepared, after careful investigation, from materials obtained from the patient. The use of either of the other kinds of preparation must be regarded as partaking of the nature of

a pseudo-scientific gamble, or a medical practice on the hit or miss principle. For these various reasons, there can be no doubt that vaccines have been employed improperly in many ways, a fact which makes it all the more difficult to form a sound opinion as to their true value as therapeutic agents.

In attempting to appraise the value of vaccines, we need to remember that patients do recover from the bacterial infections without any very direct assistance from the doctor; this is a fact that makes it clear that they have natural powers of resistance thereto, independent of the physician's drugs. We know that this power of recovery is due to the fact that the tissues can form antibodies to any foreign albuminous substance which is soluble in the tissue fluids. Exponents of vaccine therapy have, therefore, the advantage of a logical claim that they are guided by a definite principle; that is, they use a substance which can produce a certain physiological effect and, moreover, use it with greater rational support than is possible with most drugs available for oral administration. For success, three conditions must be observed; they are (1) that the correct micro-organisms be used for the vaccine, (2) that suitable doses be injected, and (3) that the patient's tissues are capable of responding. Errors are only too easily made with regard to the first two, but they are capable of correction; unfortunately, the third condition remains an unknown quantity. In the matter of using only the correct micro-organism for the preparation of the vaccine, too much importance cannot be attached to the proper collection of infected material from which that micro-organism is to be isolated. Not infrequently, this is relegated to the patient or the nurse; this leads to many errors and increases difficulties that are quite sufficient already. The material collected must come from the actual lesion suspected as the cause of the infection and, here it may be remarked, it matters much that the process shall be one of proved infection. To isolate a micro-organism from some part of a patient's body and to assume that his disease is therefore due to its activities is, in the sphere of diagnosis, but the analogue of the phylacogen in the sphere of treatment. Once the material is collected, it must be dealt with promptly, for many of the failures to make efficient vaccines are failures in eliminating contamination rather than failures in tapping the true centres of infection. Of methods of preparing the vaccine, one need not consider in this article beyond saying that it seems immaterial whether it be prepared by heat, by autolysis, or by the use of antiseptics; on sensitized vaccines, some remarks follow subsequently.

Of the question of dosage and of interval between doses of a vaccine it is difficult to say very much or to be dogmatic, as our knowledge is at present inexact as to both these factors; our chief guides are tradition and personal experience. Without producing untoward results, the range of effective dosage in man is probably considerable for the greater number of everyday vaccines. Of the various systems of dosage, that which begins with a presumed subminimal dose and increasing to a dose beyond which it is thought or found that bad effects follow, seems to be the method in most general use. In chronic infections that tend to recur, like furunculosis, it is often better to graduate the dose in a reverse order; on the other hand, in acute infections, a stoppage system of dosage by which three doses of increasing size are given at short intervals, followed by a pause, the second series beginning with the final dose used in the first series, and so on; this method appears best adapted when employing sensitized vaccines in the acute infections. By intervals is meant from seven to ten days in chronic cases, and twenty-four to forty-eight hours in acute cases. On these points, one is not prepared to be dogmatic, as intervals must be determined by the course of the disease and by the apparent effects produced. Some people are very susceptible, especially to pneumococcal vaccine, and in many instances it may be necessary to continue treatment over long periods with gradually increasing intervals, because the duration of immunity varies greatly as to particular micro-organisms in different individuals. For example, the more acute infections of the upper air passages are due generally to streptococcus or pneumococcus, either of which may be rapidly fatal from a general blood poisoning. In these cases, experience indicates the value of a large dose of the vaccine given early and repeated; this practice is especially suited to the sensitized vaccines, as these are less likely to make the patient worse than non-sensitized preparations. In the acute streptococcal infections doses of 100, 500 and 1,000 million can be given boldly on three successive days and often with the best of results. In the acne class of cases the doses may and should be comparatively small; weekly doses of from 2 to 10 or 30 to 90 million are usually sufficient, as anything over 90 million seems, more often than not, to aggravate the symptoms.

The practical or clinical use of vaccines appears to be confined to the treatment of such diverse ailments as acne, boils, seborrhœa oleosa, sycoses, staphylococcal infections of the scalp, folliculitis, certain types of alopecia areata, influenza, colds in the head,

chronic nasal discharges, chronic bronchitis, asthma, pneumonia, arthritis, endocarditis, colitis, bacilluria and the general septicæmic infections by various streptococci and staphylococci, as in puerperal sepsis. The value of vaccines in all these diseases is most unequal; the most consistently good results appear to have been obtained in the skin cases of chronic pustular infection, from which it is relatively easy to isolate the active micro-organism and from it to prepare an autogenous vaccine. It is otherwise with many of the generalized infections, and especially with malignant endocarditis, from which it is obvious that the preparation of a true autogenous vaccine is extremely difficult; occasionally, in streptococcal septicæmia a few doses of a sensitized stock coccal vaccine produce a result which is little short of magical and, now and again, a pneumococcal case, similarly treated, gives a brilliant result; obviously, these are shots in the dark and savouring of pure empiricism. The treatment of enteric fever by autogenous vaccine has, so far, been disappointing, but, here and there, one meets with encouraging reports of severe cases improved and assisted by vaccine therapy. In the same category of failures for the most part must be placed cases of colitis and bacilluria; the difficulties in the way of making a true autogenous vaccine from this class of patient are enormous, but the experiences gained do not warrant our total abandonment of efforts to treat these cases by a vaccine; by its means we can reduce the number of pus cells and micro-organisms in the urine, reduce the fever and relieve pain and other local symptoms. One writes from a personal experience of a pyelitis in a near relative, in whom a vaccine, although unable to cure, most certainly helps to make life more bearable for the patient. The case teaches the important fact of a need to examine the urine from time to time to ascertain if the same micro-organism is the cause of the trouble; in the particular case one has in mind no less than three different organisms were isolated from the urine in the course of eighteen months, and respective infections by each were the apparent cause of the acuter symptoms, as vaccines made from the respective cultures were markedly beneficial; the particular micro-organisms isolated and so used were a streptococcus, the *Bacillus proteus* and *B. coli communis*.

Some of the most encouraging results follow the treatment of pyorrhœa alveolaris, accompanied by a general sepsis, when an autogenous vaccine is used. In these and analogous cases it is necessary to remove or drain the focus of infection. There is also a large group of cases which respond excellently to vaccine therapy,

classed under such headings as colds, pharyngitis, laryngitis, and chronic infection of the upper air passages. The active organisms are the pneumococcus and *Micrococcus catarrhalis*, or the pneumococcus and the influenza bacillus in combination; many of the patients are feverish in the early stages and not a few are suspected of tuberculosis. There is abundant evidence that suitable vaccines will often cure them; the corollary suggests itself why, when a severe catarrhal or influenzal epidemic is prevalent, should not the bold employment of a stock vaccine be a means of protecting individuals against an insidious, prostrating and most unromantic affection? Reports indicate that some much up-to-date practitioners have succeeded in demonstrating the value of the idea. Of course, the real value of vaccine therapy is the relief of toxic symptoms, and this explains why we find it giving good results in somewhat unexpected kinds of case. Asthma is often due to the presence of infection in the nose, tonsils, or upper air passages; a vaccine prepared from an infecting organism isolated from the focus will in most cases diminish the severity and frequency of the attacks; technical literature is full of reports of such cases. Rheumatoid arthritis is also a condition in which a focus of infection is to be found frequently; if it cannot be completely removed, vaccines will often assist the surgical treatment, when employed either for a short time before or for a long time afterwards. This suggests the cognate idea of using a vaccine before operations in which there is a danger of septic infection, say, for example, in obstetric practice as a prophylactic against puerperal sepsis. In the development of this notion, the value of the sensitized vaccines is pre-eminently indicated.

The utility of vaccines in pneumonia has been the subject of considerable attention, but the difficulties are great in arriving at an accurate estimate of the procedure, owing to the constant change in type of pneumonia and the varying intensity of virulence displayed by the pneumococcus in different seasons. We recognize that a vaccine to be potent ought to be autogenous and used early; but this is a matter of great difficulty, as the disease, being of such acute and short duration, has either subsided or terminated fatally before the vaccine can be prepared. In these cases, therefore, recourse must be made to a stock vaccine or a homologous vaccine prepared from a pure culture of pneumococci isolated from the blood of a patient suffering from lobar pneumonia. This means a disadvantage, because the strains of pneumococci vary much in their virulence and characteristics, so that there is no certainty

that a vaccine is being used and prepared from the same type of infection as that from which the patient is suffering. In spite of this, the results with stock vaccines in acute pneumococcal infections are encouraging, but they must be used on the first or second day, as once a general blood-stream pneumococcic infection has been established the vaccine is of little value, and seems to exert little or no influence on the course of the attack. The effective dose is not less than fifty million, followed in twenty-four hours by another of one hundred million; it seems to be mere trifling to give smaller doses, as the effective action must be prompt and vigorous. Making all due allowance for the optimism of workers in this field, one cannot resist the conclusion that in a pneumococcus vaccine we have a valuable aid in the treatment of pneumonia and, although not a specific remedy, it should be used in those cases of a virulent type which threaten the life of the patient.

Mention has been repeatedly made of sensitized vaccines, and their value emphasized in the acute infections by streptococci and pneumococci; it may not be time wasted if we recall briefly the main facts with regard to this particular kind of vaccine. The procedure adopted usually in the preparation of sensitized vaccines is similar to the method originally employed in 1902 by Besredka, when he first introduced them. Pure cultures of the indicated organism are allowed to remain in contact with homologous immune serum for a sufficient time to permit of the adsorption by the bacteria of the specific antibodies present in the serum. When this has taken place, the bacteria are centrifuged down and the supernatant fluid removed and replaced by normal salt solution. The deposited bacteria are then shaken up and the process is repeated until the last trace of serum is removed from the bacterial bodies. Besredka favours the use of living sensitized vaccines, but with us the general practice is to kill the bacteria, after sensitization, by the addition of one per cent phenol to the terminal washing. The advantages of a sensitized vaccine are that it is less toxic than the ordinary whole vaccine and confers a more rapid and more permanent immunity. The mechanism of the immunity conferred is probably that, during sensitization, the bodies of the bacteria become covered over with specific agglutinin and opsonin, and the bacteria, thus sensitized, are so readily taken up by the polymorphonuclear leucocytes that bacteriolysis occurs in the interior of the phagocytes and endotoxin is liberated, and the production of antibody much stimulated by the endotoxin thus set free in the interior of the leucocytes. The essential factor in

the process appears to be a shortening of the preliminary work of the phagocytes. There has accumulated a large body of evidence that these sensitized vaccines are a very great advance upon the earlier or whole vaccines; Continental workers favour the use of living vaccines, but taking into consideration the fact that our knowledge of the factors which influence the variation of bacterial virulence is still rudimentary, the indiscriminate use of living vaccines in treatment would seem undesirable. Another difficulty is the question of the best antiserum for sensitization of the bacilli; this appears to be largely a matter of individual opinion. Some use polyvalent antiserum, others use autogenous serum, and so on. The sensitized vaccines in common use are derived either from stock vaccines, or are prepared from the causal organism isolated from the patient; here again there does not seem to be any well-marked uniformity of opinion, though everything points to the superiority of an autogenous source.

In attempting to cast up a balance-sheet in respect of this question of vaccine therapy, we must admit that the failures are undoubtedly more numerous than its successes; curative vaccine treatment must be admitted to have disappointed the high hopes with which it began, and in this respect its history resembles that of most remedies. The problem of immunity is so complex that it is highly probable that the technique or practice, rather than the principle, of vaccine therapy is at fault, and that in time this may be so perfected as to establish the status of vaccines as a reliable remedy. For the present, their use appears to be justified only when trustworthy therapeutic methods have failed or do not exist; anyhow, few will argue that the specific action of vaccines is as certain as that of such drugs as mercury, arsenic, digitalis, or the iodides, bromides and salicylates. In spite of this we are not precluded from recognizing that we have in vaccine therapy a weapon of great value against the infective diseases. Too much uniformity of results has been and is expected from vaccine treatment by many, who forget the complexity of the causal factors in many of the infective processes, and the variations even in the natural course run by them. The critic must remember also the difficulties there are in ensuring the proper correlation of the vaccine used with the pathological condition under consideration and, above all things, patience is necessary in order to determine the best mode of calling out the specific response. In connexion with all kinds of disease, the therapeutic argument is notoriously difficult, and nowhere is it more so than in relation to the infective

processes. Most of us have had cases under our notice in which the patient has made a specific response to inoculations and thereby been cured of his infection by a vaccine; even one positive case of the kind must outweigh many cases of apparent or real failure. So much are we still in the dark as to the inner facts of recovery from an infective process, that our position may be well described as though we wandered up and down a long passage, into which many locked doors opened, with a key in our hands trying each door with it. Owing to the key not fitting, many locks refuse to open, but then there comes one in which the key turns and the door opens. The simile of a lock and key illustrates the specific stimulus and response of a vaccine given in a successful case; our problem is, does any key fit any door and how frequently are we able to find the proper key?

In this search for a proper key or proper lock, and this quest for a specific response to a specific stimulus, it must be borne in mind that the object is not to see from what depths we can raise the patient by a specific stimulus, but rather to supplement those general measures that have raised him or her already to a certain level, at which he or she now remains, until the extra leverage of the vaccine completes the process. This conception makes it necessary, in all cases, not to neglect attention to non-specific points in treatment, as the general condition of the patient is a factor of vital importance in getting the best effect from a vaccine. Too often, this elementary point is overlooked or ignored while, in other cases, failures to use vaccine therapy successfully are to be explained by the want of a rudimentary knowledge of the practical application of bacteriology to disease on the part of practitioners. It is obviously futile to order a vaccine to be prepared from the urine or fæces for a case diagnosed as myocarditis, or to suggest that the treatment for lumbago is a vaccine prepared from an organism isolated from the pharynx; equally misleading would it be to say that a vaccine has failed to do any good, when it is eventually shown that the patient was suffering all the time from cancer of the rectum. These are not fantastic examples quoted to score a point or be facetious, they are typical of everyday experiences by those in technical practice, and have an obvious lesson for us who are not.

Some personal experience prompts the opinion that vaccines are valuable in mitigating symptoms and causing the disappearance of infections in some acute and chronic cases, but not in all. The present state of our knowledge is so incomplete that we can neither

account for failures nor predict success in vaccine therapy. There is still much to learn, but the following points need emphasizing; they are: (a) Vaccines are to be regarded and employed essentially as supplementary therapeutic agents, and not as substitutes for established methods; (b) where a disease is attributable to a focus of infection, that focus should if possible be eradicated, or treated by recognized procedure and, if necessary, by the employment of a vaccine; (c) in many cases, the focus of infection remains and relapses ensue; it is in these cases that a vaccine may relieve symptoms but without curing the disease; (d) in the acute infections the use of vaccines is contra-indicated as a general rule; if used in acute cases, the dosage should err on the small side, whereas in chronic cases increasing doses of a vaccine may be pushed often with confidence; (e) all experience indicates that, though a vaccine may do no good, a vaccine does no permanent harm.

The general conclusion is, therefore, permissible that vaccine therapy is still on its trial; startling and brilliant cases of success have been recorded, but there remains still the doubt whether the success can be attributed to the vaccine alone. The plain truth is, we need more knowledge and the necessity is brought home to us for a closer co-operation between pathological inquiry in the laboratory and clinical noting in the ward, for it is only by the test of clinical experience that the value of any remedy in disease can be decided ultimately. We cannot overlook the fact that the disappointments in the use of vaccines have been many, but the future holds out definite promise. The present methods may be crude and often misdirected, yet practice and research may improve them and give them the precision they now lack. In hopeful confidence of the arrival of that day, we must leave the subject.

THE SUBSTITUTES FOR SALVARSAN AND NEO-SALVARSAN.

By MAJOR E. G. FFRENCH.

Royal Army Medical Corps.

THE chemistry of kharsivan and neo-kharsivan is said to be identical with salvarsan and neo-salvarsan according to a report in the *Lancet* of April 10, 1915, by the Secretary of the National Medical Research Committee. The details of their preparation being identical, it is not proposed to discuss the chemistry or the preparation of these products here, but rather to state our observations and the clinical results obtained after their use. We have also used a third substitute, viz., novarseno-benzol "Billon," a French preparation, manufactured by Poulenc Frères.

BILLON.

Billon is of a darker yellow colour than neo-salvarsan. It consists of a yellow powder somewhat darker than the 914, dissolving readily in water, and forming a clear yellow solution. We dissolve it in ten cubic centimetres of freshly distilled water and inject it intravenously immediately afterwards.

NEO-SALVARSAN.

Neo-salvarsan forms a clear yellow solution and dissolves readily. I first saw this concentrated solution tried with success by Professor John Fordyce, of the City Hospital, New York, in 1912, and I have adopted the method since then.

NEO-KHARSIVAN.

Neo-kharsivan is a reddish-brown powder and dissolves quickly, forming a reddish-brown solution.

KHARSIVAN.

Kharsivan is a yellow powder which does not dissolve readily in water unless the following procedure is carried out: The powder is poured on to about three dozen glass beads in a large glass flask which is sterilized in a hot-air sterilizer at 160° C.; the flask is shaken to allow the powder to mix with the beads, then about 20 c.c. of saline made of freshly distilled water is poured in

and the flask is shaken with a swirling motion for a few seconds, and then more saline is poured in and the flask shaken for about half a minute; finally, the remaining portion of 100 c.c. of saline is put in and the flask is shaken again, taking care not to shake vigorously. A clear yellow solution is the result, and the time taken is about three minutes. If the powder is put in after the 100 c.c. salt solution it will take some ten minutes to dissolve on account of the gelatinous-looking masses which are formed and which are very troublesome to dissolve. The next step is to neutralize with sodium hydrate, of which we use a 4 per cent solution. The quantity required to dissolve 0.6 grm. being 4.8 c.c., i.e., 8 c.c. to every decigramme. After neutralizing we add another 150 c.c. of saline, making the total amount 250 c.c. The salt solution is 0.9 per cent, that is 8.5 grm. of physiological sodium chloride to one litre of distilled water. It is injected at body temperature. With regard to the concentrated solution of neo-salvarsan, neo-kharsivan, and billon—the same amount of water, 10 c.c., is used to dissolve a moderate dose or a full dose. The solution is injected cold owing to the greater tendency to rapid oxidation.

THE MODE OF INJECTION.

A ten cubic centimetre record syringe is used, and after the barrel is filled the needle is introduced into the vein, and the piston withdrawn slightly so as to enable one to see if the needle has entered the lumen of the vessel. If it has, then a little blood will enter the barrel, and the piston may now be gradually pushed home. The skin over the vein is always painted with a solution of iodine and chloroform, one in fifteen before and after the operation, and a small square of sterile gauze placed over the puncture and sealed with collodion. We have used boiled tap water on many occasions without any appreciable reaction, but we cannot recommend this as a routine measure, as chemical impurities of water in different districts vary, and serious trouble may ensue.

THE PREPARATION OF THE PATIENT BEFORE INJECTION.

All the organs and the urine are examined the day before, and pil. hydrarg, four grains, given in the evening, and mist. alba, one ounce, in the morning. At 7.30 a.m. a breakfast consisting of tea and bread and butter is allowed. The injection is given during the forenoon and if there are no immediate after-effects the patient is given tea and bread and butter at 4.30 p.m. Ordinary hospital

dinner is allowed at 7.30 p.m. if he remains free from fever, vomiting, and headache, etc. He is kept in bed until the following morning.

ROUTINE TREATMENT.

Since the beginning of the war the routine is to give three injections of salvarsan or neo-salvarsan at intervals of ten days. The day after the first intravenous injection mercurial cream one grain is injected into the buttock, and this is carried out for nine consecutive weeks. We had to limit the number of injections of salvarsan and neo-salvarsan owing to the shortage of supplies, but the clinical results in the Wassermann reaction have justified the procedure. A large number of patients have had their blood tested by the Wassermann method two months after the completion of their course and the results have been highly satisfactory. Cases having a persistent positive reaction a month later on were given another complete course of treatment. Owing to the departure of nearly all the patients for the Front, we have not been able to follow the blood reaction beyond this.

Salvarsan 0.6 grm. or neo-salvarsan 0.9 grm. is nearly always given as a first dose, unless the patient is very light in weight or we think that he is unable to withstand the full dose. By this I mean a patient whose capability of eliminating arsenic is diminished as evidenced by some alteration in the renal or hepatic functions.

Salvarsan 0.4 grm. or neo-salvarsan 0.6 grm. is given as a second dose unless the patient had only a moderate dose at first, when the full dose is given.

A full dose is given for the third injection, so that the patient receives the routine dose 0.6 grm., 0.4 grm., and 0.6 grm. of salvarsan, or 0.9 grm., 0.6 grm., and 0.9 grm. of neo-salvarsan. The same procedure is being adopted with the substitutes kharsivan, neo-kharsivan, and novarseno-benzol.

Over one hundred cases, comprising primary, secondary, and tertiary, have now been treated with the substitutes, and we have come to the conclusion that kharsivan and neo-kharsivan are somewhat more toxic than salvarsan and neo-salvarsan.

The following percentage will give a clear idea of the immediate after-effects produced. Of 136 injections of kharsivan, 60 per cent gave no reaction, 27 per cent gave slight reaction, such as headache, slight temperature, vomiting, rigor, and diarrhoea; 13 per cent

had a severe reaction with the symptoms above mentioned. Of the 124 injections of salvarsan 63 per cent gave no reaction, 33 per cent slight reaction, and only 4 per cent severe.

Of the salvarsan cases 20 per cent were primary, 75 per cent secondary, and 5 per cent tertiary. Of the kharsivan 60 per cent were primary, 13 per cent were secondary, and 27 per cent were tertiary. Of the 25 injections of neo-kharsivan 32 per cent gave no reaction, 40 per cent slight reaction, and 28 per cent severe: 20 per cent were primary, 48 per cent were secondary, and 32 per cent were tertiary. While of the 75 injections of neo-salvarsan 72 per cent gave no reaction, 21 per cent slight, and only 7 per cent severe. The primary were 40 per cent, secondary 26 per cent, and tertiary 34 per cent. Of novarseno-benzol 42 injections were given: 76 per cent gave no reaction, 19 per cent slight reaction, and 5 per cent severe. There were 12·5 per cent primary, 12·5 per cent secondary, and 75 per cent tertiary cases. It will be noticed that the percentages of the two latter are more closely related than the former. The greatest number of severe reactions occurred in secondary and the late primary cases. The slight reaction usually abated during the course of the evening of the injection, but even the severe reaction did not last many hours, the patients feeling quite fit on the following morning. Of the severe reaction there were two cases with arsenical eruption and one case of jaundice, all the three occurring after neo-kharsivan. Herxheimer's reaction was marked in several primary and secondary cases; a few cases of slight herpes also occurred. We have been using salvarsan since 1910, and have given several thousands of injections, and are of opinion that the drug when it was first on the market was more toxic and certainly more efficient than it has been during the past three years. The German manufacturers have succeeded in attenuating the toxicity of the original product, and I think there is every reason to believe that the British manufacturers will do the same before long. Many weeks have passed since we began to employ these substitutes, and it is most satisfactory to state that we have not experienced any serious results whatever. The clinical results have been quite as rapid and satisfactory as with salvarsan and neo-salvarsan, and we believe that kharsivan and neo-kharsivan are very excellent substitutes for salvarsan and neo-salvarsan, and that so far as our experience has gone they may be safely recommended for the treatment of all forms of syphilis.

I have to thank Temporary Lieutenant C. H. Mills, R.A.M.C., for his help in the treatment and observation of the cases.

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TABLES ILLUSTRATING AND COMPARING THE TOXICITY OF THE GERMAN PREPARATIONS
AND THE ENGLISH SUBSTITUTES.

<i>Neo-salvarsan, injections given, 75.</i>						Per cent.
No reaction	..	..	..	..	54	72
Slight headache	..	..	..	..	11	21
„ „ and rigor	..	..	..	..	4	
„ vomiting	..	..	..	..	1	
Severe headache	..	..	..	..	1	7
„ „ slight vomiting, and rigor	..	..	..	..	1	
„ diarrhoea	..	..	..	..	3	
Per cent.						
Primary	..	..	..	..	40	
Secondary	..	..	..	..	26	
Tertiary	..	..	..	..	24	

<i>Novarseno-benzol, injections given, 42.</i>						Per cent.
No reaction	..	..	..	..	32	76
Slight headache	..	..	..	..	2	19
„ rigor	..	..	..	..	1	
„ diarrhoea	..	..	..	..	2	
„ „ and headache	..	..	..	..	2	
„ vomiting, headache, and rigor	..	..	..	..	1	5
Severe headache	..	..	..	..	1	
„ „ slight diarrhoea, and rigor	..	..	..	..	1	
Per cent.						
Primary	..	..	..	..	12.5	
Secondary	..	..	..	..	12.5	
Tertiary	..	..	..	..	75	

<i>Neo-kharsivan, injections given, 25.</i>						Per cent.
No reaction	8	32
Slight headache	3	40
„ rigor	..	..	..	..	1
„ diarrhoea	..	..	..	..	1
„ „ and rigor	..	..	..	..	1
„ vomiting and rigor	..	..	..	..	1
„ diarrhoea and headache	3	28
Severe headache	..	..	..	..	1
„ „ slight vomiting, rigor, and diarrhoea	..	..	..	..	1
„ „ „ rigor, diarrhoea, and jaundice	..	..	..	..	1
„ „ „ vomiting, diarrhoea, and arsenical eruption	..	..	..	..	1
„ „ „ diarrhoea, and arsenical eruption	..	..	..	..	1
„ „ „ vomiting, and rigor	..	..	..	..	1
„ „ severe vomiting, and diarrhoea	1	
Per cent.						
Primary	20	
Secondary	48	
Tertiary	32	

Salvarsan, injections given, 124.

							Per cent.
No reaction	78	.. 63
Slight diarrhoea	8	.. 33
" headache	..	..	..	..	..	4
" rigor ..	..	..	..	..	..	2
" vomiting	..	..	..	..	..	2
" diarrhoea and headache	..	..	..	..	..	2
" " " rigor	..	..	..	..	..	1
" " " vomiting	..	..	..	..	..	1
" " vomiting, and headache	..	..	..	..	..	1
" " severe headache, and slight rigor	..	..	..	..	..	1
" " " " slight rigor, and severe vomiting	..	..	..	..	..	1
" " " " and severe rigor	1	.. 4
" headache, rigor, and vomiting	..	..	..	..	..	6
" " and vomiting	..	..	..	..	..	2
" " " rigor	..	..	..	..	..	6
" " vomiting, and severe rigor	..	..	..	..	..	1
" " and severe diarrhoea	..	..	..	..	..	1
" rigor and vomiting	..	..	..	..	..	1
Severe headache, vomiting, and slight rigor	..	..	..	..	..	1
" " rigor, and diarrhoea	..	..	..	..	..	1
" " and severe diarrhoea	..	..	..	..	..	1
" " slight rigor, and vomiting	..	..	..	..	..	1
" rigor and vomiting	..	..	..	..	..	1

						Per cent.
Primary	..	..	..	..	..	20
Secondary	..	..	..	..	..	75
Tertiary	..	..	..	..	..	5

Kharsivan, injections given, 136.

							Per cent.
No reaction	81	.. 60
Slight headache	10	.. 27
" vomiting	..	..	..	..	..	1
" rigor ..	..	..	..	..	..	2
" diarrhoea	..	..	..	..	..	3
" headache and rigor	..	..	..	..	..	2
" " " diarrhoea	..	..	..	..	..	6
" " diarrhoea, and vomiting	..	..	..	..	..	3
" " " vomiting, and rigor	..	..	..	..	..	2
" " vomiting, and rigor	..	..	..	..	..	1
" " and severe rigor	..	..	..	..	..	1
" " slight diarrhoea, and rigor	2	.. 27
" rigor and diarrhoea	..	..	..	..	..	2
" " vomiting	1	

Kharsivan, injections given, 186—continued.

						Per cent.
Severe headache	..	..	..	..	7	
„	„	slight vomiting, and	diarrhoea	..	1	
„	„	severe vomiting, and	slight diarrhoea	..	1	
„	„	and slight diarrhoea	..	..	1	
„	„	„	rigor	..	..	1
„	„	slight rigor, and	diarrhoea	..	..	1
„	„	rigor, vomiting, and	slight diarrhoea	..	..	1
„	„	vomiting, and	slight rigor	..	..	1
„	„	and vomiting	..	..	..	1
„	„	„	rigor	..	..	..
„	„	rigor, vomiting, and	diarrhoea	..	..	2
„	„	slight rigor, and	vomiting	..	..	1
						13
						Per cent.
Primary	..	..	..	..	60	
Secondary	..	..	..	..	13	
Tertiary	..	..	..	..	27	

The large doses of kharsivan and neo-kharsivan were used in the first one hundred cases to enable us to test the toxic effects of the drugs, but since then we have been treating all cases with four weekly injections of 0.4 gm. kharsivan, or 0.6 gm. neo-kharsivan, or five weekly injections of 0.3 gm. kharsivan. We have found that the percentage of severe after-effects is very small and we recommend these smaller doses as a routine treatment.

IDENTIFICATION OF THE MENINGOCOCCUS.

By MAJOR M. H. GORDON.

Royal Army Medical Corps.

THE following preliminary observations were made for the purpose of determining whether the capacity of the meningococcus for absorbing its own agglutinin could be used practically for the purpose of identifying the micro-organism of the present outbreak.

Method.—The emulsion used in these experiments was a suspension in normal saline of a twenty-four hour growth of the coccus, and this suspension was heated for thirty minutes to 65° C. in order to kill the micro-organism and to inactivate the autolysin. Raymond Koch has shown that a suspension of meningococci heated in this way keeps for months, and gives as reliable results at the end of that time as in the first place. The macroscopic method of agglutination was used; and the results were read off after twenty-four to forty-eight hours at 55° C., as recommended by Kutscher. A control with normal horse serum was put up in each experiment and proved negative in all.

(1) *Does the serum prepared against meningococci of previous epidemics agglutinate strains of the present outbreak?*

The anti-meningococcus sera tested were as follows:—

Flexner's serum
 Mulford serum
 Burroughs and Wellcome serum
 Lister Institute serum (M. 10).

These four sera were tested in 1 in 50 dilution against three meningococci isolated from the cerebro-spinal fluid of recent cases, and against fourteen meningococcus-like organisms isolated from the nasopharynx of recent contacts.

Result.—None of the three meningococci were agglutinated by any of the four sera. Six of the fourteen meningococcus-like organisms from the nasopharynx showed well-marked agglutination, the rest were negative.

(2) *Does serum prepared against a strain of meningococcus isolated from the cerebro-spinal fluid of a case during the present outbreak agglutinate strains from the cerebro-spinal fluid of other cases in the same outbreak?*

In order to prepare a specific serum quickly, the intensive method of Fornet and Müller was used. A rabbit was injected

with increasing doses of meningococcus (Strain L.) on three successive days. A twenty-four hours' culture of the meningococcus on legumin agar was emulsified in 5 c.c. of saline, and 0.2, 0.3, and 0.4 c.c. of this per kilo, injected intravenously into a young rabbit at intervals of twenty-four hours. On the twelfth day the rabbit was killed, its blood collected, and the serum separated off and tested on four meningococci isolated from the cerebro-spinal fluid of four recent cases.

The agglutination results produced by it were as follows:—

Meningococcus strain	DILUTION OF SERUM			
	1 in 20	1 in 40	1 in 80	1 in 160
L.	+	+	+	+
D.	+	+	+	-
B.	+	+	+	(+)
J.	+	+	+	(+)

It is clear that the serum prepared against Strain L. agglutinated the other three meningococci almost as well as the homologous strain.

(3) *Do these four meningococci absorb completely the specific agglutinin from the serum of the rabbit prepared against one?*

Experiment.—Six loopfuls of a twenty-four hour culture were added to 1.5 c.c. of a 1 in 10 dilution of the specific serum in normal saline. This suspension was kept for three hours at 37° C., followed by one hour at 55° C. The cocci were then centrifuged out, and the titre of the serum determined for the coccus with which it had been saturated, and also for the particular strain of meningococcus with which the rabbit had been injected.

Result.—Three of the four meningococci completely absorbed the specific agglutinin. The fourth coccus failed to entirely absorb the whole of the agglutinin for itself, so in that case the result is not yet complete, and the test is being repeated.

The above results, so far as they go, appear to indicate that the four strains of meningococcus examined are alike in their agglutinating behaviour towards a serum prepared against one of them, and that three of the four absorb this specific agglutinin.

(4) *Application of the results of the experiments described under 1, 2, and 3.*

Application was now made of this test for the purpose of

determining whether certain meningococcus-like organisms isolated from the nasopharynx of recent contacts, and of cases of illness of doubtful character suspected of being cerebro-spinal fever, were or were not identical with this meningococcus from three cases of the present outbreak.

The cocci have been tested against the same serum as the foregoing and examined with regard to:—

(1) Agglutinating titre.

(2) Capacity of absorbing the specific meningococcus agglutinin.

Case 1.—Lieutenant B. This case was an alleged carrier who had been in isolation for some time. His coccus was practically indistinguishable from the meningococcus in cultural and fermentative characters.

When examined with the rabbit's serum, it was found that the agglutinating titre was as follows:—

	1 in 20	1 in 40	1 in 80	1 in 160
Meningococcus	+	+	+	—
Lieutenant B.'s coccus ..	+	+	—	—

The serum was saturated with Lieutenant B.'s coccus, and the agglutinin for that organism thus removed.

The serum was then examined once more against both cocci with the following result:—

	1 in 20	1 in 40	1 in 80	1 in 160
Meningococcus	+	+	+	—
Lieutenant B.'s coccus ..	—	—	—	—

It is clear that while the coccus in question removed its own agglutinin, it failed to bind the agglutinin of the meningococcus of the present outbreak, and therefore could not be identified with that micro-organism.

Case 2.—Another coccus closely resembling the meningococcus was isolated from the nasopharynx of a case suspected clinically of being cerebro-spinal fever without meningitis. Culturally, and in regard to fermentative characters, this coccus could not be distinguished from the meningococcus; but as it failed to show agglutination with the specific serum, even when that was only

diluted 1 in 20, this coccus could not be identified with the meningococcus.

Case 3.—A peculiar form of pharyngitis affected a certain regiment in camp. Although there were no cases of meningitis, the regimental medical officer suspected that the pharyngitis might possibly be due to the meningococcus. A swab taken from two of the cases yielded a coccus closely resembling the meningococcus in morphological, cultural and fermentative characters.

The coccus was examined in the same way as the previous two, and was found to agglutinate with the specific serum in the 1 in 20 and 1 in 40 dilution, although it did not agglutinate in the 1 in 80 dilution as the meningococcus did at the same time. Absorption tests showed that while it absorbed its own agglutinin from the serum, this coccus failed to diminish the true meningococcus agglutinin. It was, therefore, not identified with the meningococcus.

The pharyngitis has since abated, and there have not been any cases of meningitis in this camp up to date.

Conclusion.—These observations appear to suggest that the capacity of the meningococcus for absorbing its own agglutinin can usefully be employed in certain cases for the purpose of identifying that micro-organism. It must be borne in mind, however, that possibly and even probably there are several different strains of the meningococcus capable of producing meningitis, and some of these meningococci may not absorb the specific agglutinin of others. This would appear likely from the fact, amongst others, that all three meningococci from cases of the present outbreak failed to agglutinate with the samples of anti-meningococcus sera on the market, against which they were tried.

How many different strains there are at work in the present outbreak is obviously a matter of prime importance in the present connexion, and further observations are needed before the practical application and limits of the absorption test for the purpose of identifying the meningococcus can be regarded as defined. For the present, it is particularly desirable to collect meningococci from the cerebro-spinal fluid of as many cases as possible and to examine them by the absorption method. Where it is impossible to keep cultures of these micro-organisms going, a suitable emulsion of one, or better of several twenty-four hour cultures might be heated to 65° C. for thirty minutes and put aside for examination at a later date.

I wish to thank Mr. E. G. Murray for the great assistance which he has rendered in carrying out these experiments.

X-RAY WORK WITH THE MEDITERRANEAN EXPEDITIONARY FORCE.

BY LIEUTENANT HAROLD MOWAT, M.D.

Royal Army Medical Corps.

As a great deal has been written in the medical journals concerning the X-ray appearances of wounds received in France, it will probably be of interest to the profession to have placed on record some facts regarding the injuries which have been inflicted in the Dardanelles. It will be all the more so when it is remembered that in France the fighting has been largely on the defensive, while in the East, at any rate in the early stages, a great offensive movement was carried out, with a corresponding difference in the type and situation of the wounds received.

The X-ray department of this hospital was ready when the first batch of wounded was admitted, and on May 1 the examinations commenced.

During the month of May 410 radiographic examinations were made, and 265 radiograms taken; 273 examinations were for the location of foreign bodies, and 131 for fracture. If we conclude that in the first fortnight nearly every case examined was for wounds received when landing and during the offensive movement, and in the second fortnight for wounds received after the positions captured had been made good, and entrenching had commenced, we shall not be very far wrong, and it will be possible to compare the character and location of the injuries of these two periods.

The first thing that was noticed during the X-ray examinations was that in the first stage a large number of patients were suffering from the effects of rifle fire, and many rifle bullets were located and removed, while in the second stage shrapnel wounds were more common.

Further, in the first stage the chest and shoulders were the parts chiefly affected, and in the second stage the lower limbs suffered to a greater degree.

Of the 410 cases examined here during May, 54 were for bullets in the head and neck, 94 for bullets in the thorax and shoulder, and 152 for lesions at or below the hip-joint.

In the first fortnight there were 55 examinations of the thorax and shoulder, and in the second fortnight only 39, while of the hip

and downwards 93 examinations were made in the second period, against 59 in the first.

Another feature which was very noticeable was the great amount of comminution caused by missiles when discharged from a short distance, in contrast to the absence of any fracture in many instances, when the fire was directed from afar, as, for example, the immunity of bone from spent bullets which reached the reserve lines. Figs. 1, 2, and 3, demonstrate this point. Fig. 1 is one example of many, showing a rifle bullet in the soft parts with uninjured osseous structures. One patient had four shrapnel bullets round this region, but all the bones were intact. Contrast with this the severe comminution in the neighbourhood of the elbow in fig. 2, and of both radius and ulna in fig. 3.

In certain wounds the bullet casing alone was found, sometimes whole or in fragments, and sometimes flattened out (fig. 4). Taking the individual parts of the body, the X-ray examinations were able to frequently show depressed fragments of bone in the region of the skull. In fig. 5 this appearance is seen, and in addition apparently two shrapnel bullets in the vault, which proved to be a split single bullet. Fig. 6 shows a hole in the skull through which a bullet, pieces of which are seen below, has passed.

Several foreign bodies were located in the eye, and in the region of the lower jaw severe comminuted fractures were found. In the thorax pneumothorax had resulted in more than one instance, while fractures of the pelvis and the vertebral column were not rare. Fig. 7 is a print from a stereoscopic negative and shows a rifle bullet, which has entered the fourth dorsal vertebra, causing paraplegia, which was cured by its removal.

In the region of the wrist-joint many fractures of the carpal bones were present, as seen in fig. 8, where both the os magnum and unciform are broken.

Regarding the question of the localization of bullets, nearly all methods have been used here. In the limbs two marks have been made on the skin when viewed in two planes, or four marks with a ring localizer, and in other cases plates at right-angled planes have been taken.

In the skull postero-anterior and lateral views have generally sufficed, while in the abdomen the parallax method has been employed with success.

In all difficult examinations of the hip- and shoulder-joint, of the thorax, and in cases when a bullet has lodged in the vertebral column stereoscopic plates have been exposed. From these the

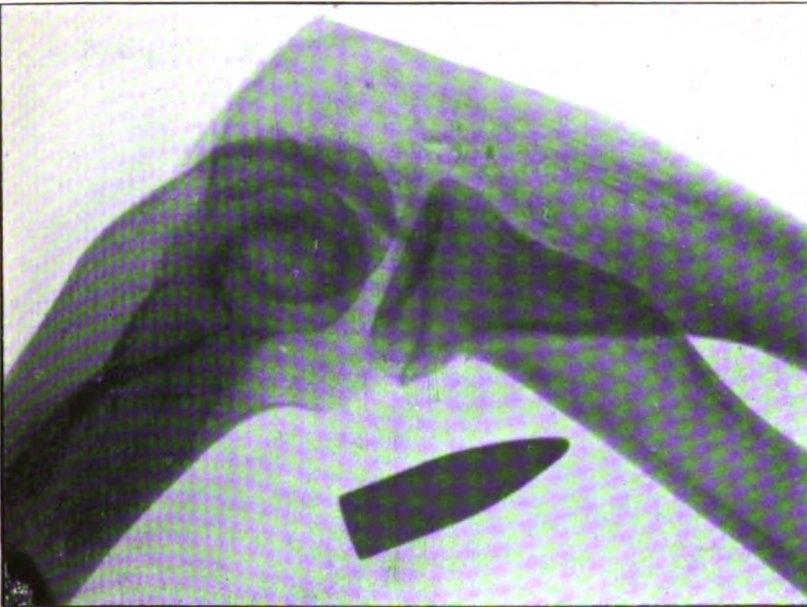


FIG. 1.

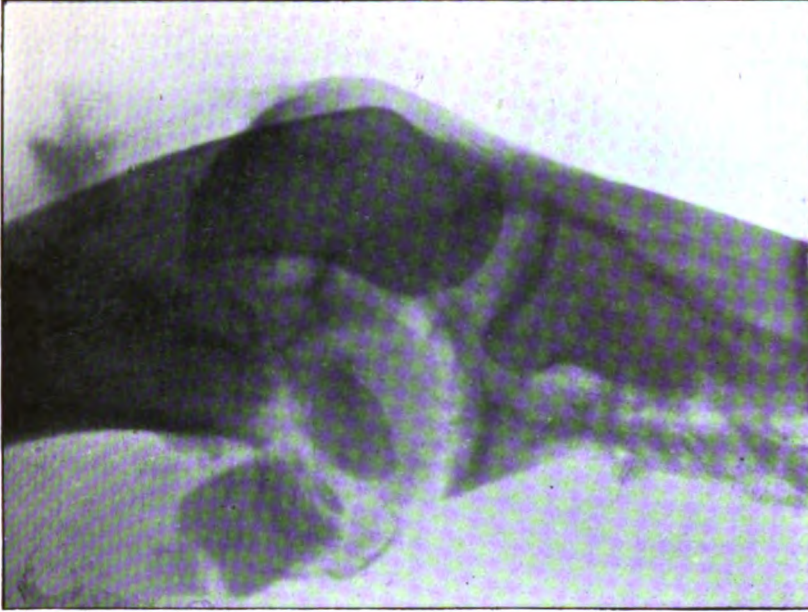


FIG. 2.

To illustrate "X-ray Work with the Mediterranean Expeditionary Force," by Lieutenant HAROLD MOWAT, M.D., R.A.M.C.

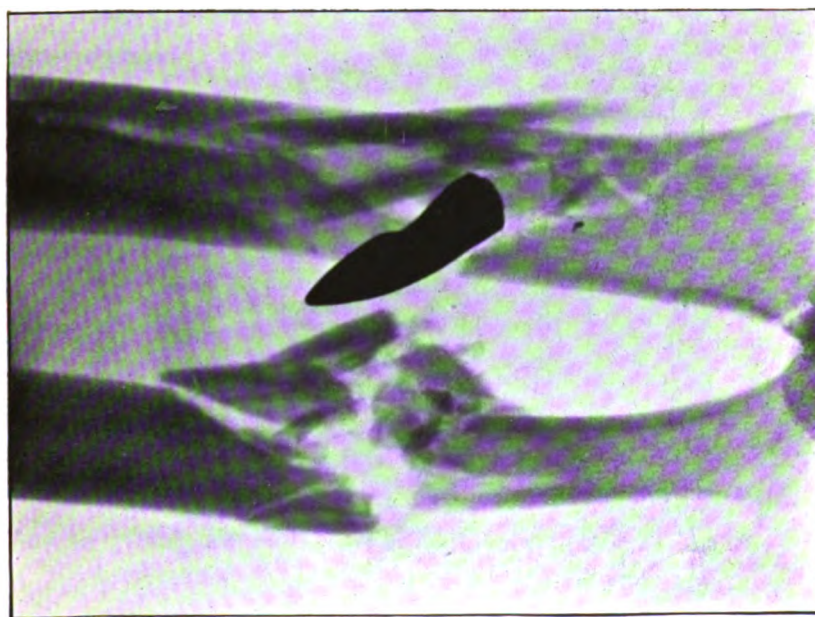


FIG. 3.



FIG. 4.

To illustrate "X-ray Work with the Mediterranean Expeditionary Force," by Lieutenant HAROLD MOWAT, M.D., R.A.M.C.

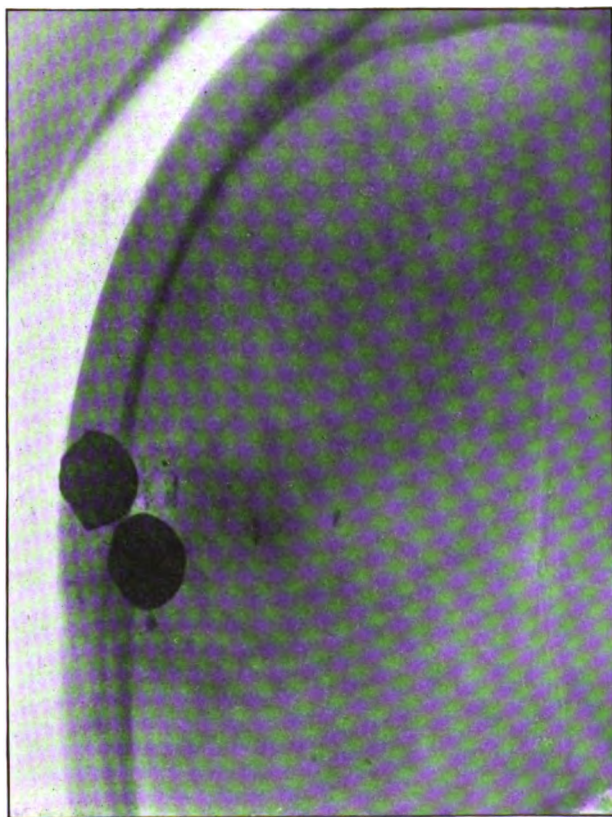


FIG. 5.



FIG. 6.

To illustrate "X-ray Work with the Mediterranean Expeditionary Force," by Lieutenant HAROLD MOWAT, M.D., R.A.M.C.

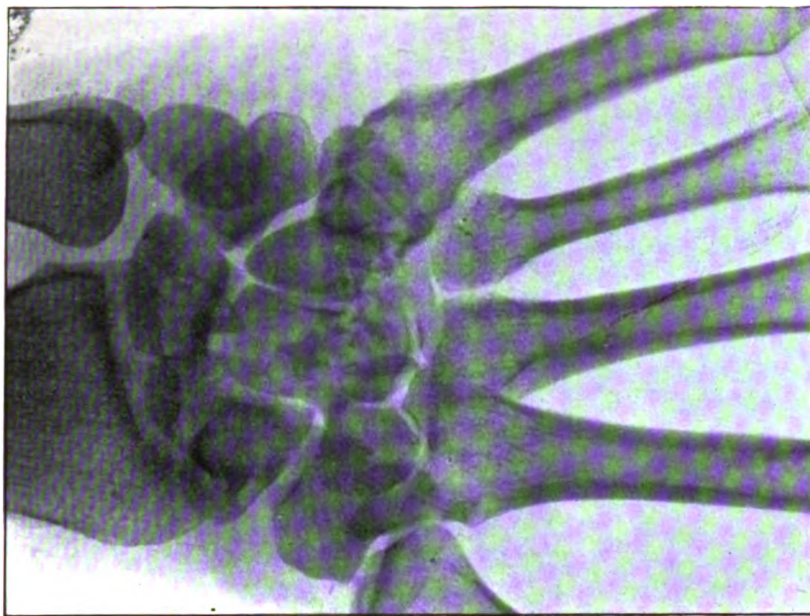


FIG. 8.

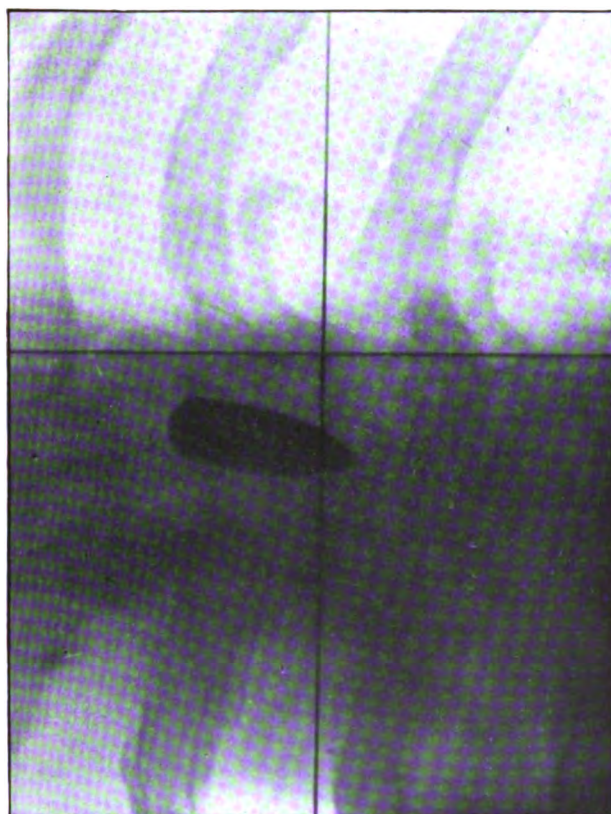


FIG. 7.

To illustrate "X-ray Work with the Mediterranean Expeditionary Force," by Lieutenant HAROLD MOWAT, M.D., R.A.M.C.

relations of the surrounding structures have been obtained and the relative position of the foreign body determined, and further by measurement of the shadow movement the calculation of the depth by the McKenzie Davidson method has been made.

The War Office evidently believe in the importance of these examinations, as with the equipment brought out from England was a McKenzie Davidson cross-thread localizer of the very latest pattern, by means of which the calculations can be made in less than half a minute, a detachable plate holder with cross wires and an excellent stereoscope which folds up into a small space.

Hampson's scale and the calculation of the depth from the amount of movement of the shadow on the screen have not been much employed, owing to the fact that as the main supply consists of six boxes of six-volt accumulators, only half of which can be used at a time, as the remainder must be charged by a small engine and dynamo, a very strong illumination is not possible and consequently for examination of deep structures other methods have been found more reliable.

Various materials have been employed for marking on the skin the position of bullets, the most successful being ink, which is applied after the skin has been rubbed over with ether in order to remove the fatty material from the pores.

In the case of rifle bullets, the axis has been indicated by drawing the outline of the foreign body upon the skin surface.

In conclusion, it may be stated that the extreme heat has made X-ray work at times very trying, and has further affected the gelatine on the plates so that it has been necessary to harden them with alum or formalin.



Royal Army Medical Corps, Rouen Medical Society.

THE sixth ordinary meeting of the Society was held at No. 11, Stationary Hospital, Rouen, on Saturday, March 27, 1915, at 3 p.m., Colonel Bruce Skinner, A.D.M.S., Rouen, in the chair.

It was resolved that during the summer months meetings should be held once a month only.

GUNSHOT INJURIES OF BLOOD-VESSELS.

Colonel Sir GEORGE MAKINS, K.C.M.G., related his experiences of gunshot wounds of blood-vessels sustained in the present campaign. The injuries may be divided into two groups, viz.: *Direct* by rifle bullets, shrapnel balls, case fragments or fragments of shell; and *indirect*, by fragments of bone. In the case of trauma by fragments of shell or bone the wounds are either contused or lacerated, the latter being predominant. Three grades of wound may be recognized.

(a) *Perforation*.—This is the least frequent and produced by bullets acting upon vessels of far smaller calibre than the missile, e.g., the anterior tibial may sustain such an injury. In this instance the steadying influence of the interosseous membrane is an important factor in determining the nature of the injury. The speaker had seen no pure example of this type of trauma except in a case under the care of Major Stoney Archer, in which a skiagram had been taken of a popliteal injury showing a Mauser bullet actually perforating the popliteal artery. In four out of twenty-nine cases of gun-shot injuries of arteries, 13·7 per cent, observed during the War, a lateral wound was present involving the walls of a contiguous artery and almost of the nature of a perforation.

(b) *Lateral Wounds*.—This is the most common variety of injury (seventeen out of twenty-nine cases, 58·6 per cent). It may consist of merely a rounded or oval opening, thus not differing materially from a perforation.

When two-thirds of the calibre of the vessel is implicated, the longitudinal retraction is very considerable, the intact portion of the wall stretching out into a narrow connecting cord. Such wounds are the most dangerous of all, differing only from complete division of the vessel in their greater capacity for bleeding.

The determining factor in the production of lateral injuries is mobility in the course of the vessel. This lateral injury is the most common form of wound of the brachial artery in the main part of its course. On the other hand, if the vessel be struck close below the origin of the circumflex arteries from the axillary trunk, or in the near neighbourhood of the bend of the elbow, where the artery is fixed in position, complete severance may occur.

(c) *Complete Division*.—This form of injury is most common in vessels

the course of which is fixed, such as the popliteal or tibials. Out of 29 cases observed during the War, Sir George had only seen complete severance in 8 (27·5 per cent). In 11 the nature of the injury was undetermined.

The speaker next referred to the distribution of injuries. Observation of isolated injuries to the smaller vessels is comparatively rare, as usually the wound of such vessels forms only a part of a more extensive lesion and becomes of minor importance.

As a general rule the frequency of implication of any individual vessel depends upon its actual calibre and the length of its course. This was shown very decisively in Colonel Makin's Bradshaw Lecture of 1913. Among 40 records kept during the present War the injuries are distributed as follows :—

Femoral ...	...	...	10 (common, 2; superficial, 8)
Popliteal ...	...	...	7
Brachial ...	...	...	6
Carotid (c)	...	...	5
Axillary ...	...	...	5
Subclavian	...	...	3
Innominate	...	...	1
Profunda femoris	...	...	1
Posterior tibial	...	...	1
Radial ...	...	...	1 = 40

In connexion with actual wounds of the great vessels it is of interest to note the numerous instances in which a large trunk such as the common or superficial femoral is seen lying exposed in a septic wound of the groin, whilst secondary hæmorrhage from such trunks had not in the speaker's experience been at all common.

A special form of localized lateral wound affording the opportunity for very free hæmorrhage is that caused by the severance of a large branch in immediate contiguity to the parent trunk.

Sir George next discussed the results of wounds of arteries.

Referring to *primary hæmorrhage* he observed that the classical belief in the small tendency to bleeding of this nature has been fully substantiated by observation at the base hospitals. Actual numbers regarding deaths upon the field from this cause are, however, still wanting.

Reactionary hæmorrhage has not been uncommon in the ambulance wagons and trains, but usually of a nature capable of control.

Secondary hæmorrhage has been common, but in a vast majority of cases from branches and not from the main trunks. Secondary hæmorrhage is especially liable to occur from branches whose position is fixed, such as the circumflex branches of the axillary, or the articular branches of the popliteal.

As regards the *spontaneous cessation of hæmorrhage*, this is usually the result of formation of a firm clot in the proximal end of the vessel, and a less firm and extensive coagulum in the distal end. Meanwhile the arterial trunk itself contracts materially in size, one-third or more.

This condition is maintained as is seen in operations from the third day onwards for many weeks, probably as the result of permanent diminution of the volume of blood entering and traversing the main channel.

Certain vessels, however, which form part of a large neuro-vascular bundle occupying a large vascular cleft, seem especially favourably situated with regard to the spontaneous cessation of hæmorrhage. Thus in five cases of wound of the axillary artery (12·5 per cent) on no occasion did hæmorrhage occur freely and no secondary consequences ensued.

On the other hand, in certain positions, pure aneurismal varices form with great ease; e.g., carotid and the femoral in Hunter's canal. In many instances no trace of blood is to be found in the sheath, whilst the vessels are as neatly and accurately united at the end of a few days as if they had been sutured. In one of the carotid cases observed, the wound in the left common carotid was stellate in outline. Finally, hæmorrhage may cease through the formation of an arterial hæmatoma. This contracts and condenses to form a false aneurism. The latter may solidify and so produce a permanent cure.

Discussing the other results of wounds of vessels the speaker referred to the permanent lowering of the vitality of a limb supplied by the injured vessel. In this connexion it is hoped that some definite information may be forthcoming after the termination of the war, since it is a matter bearing so materially on the question of the relative advantage of ligation or suture of vascular wounds respectively.

Another important result of severe trauma to a vessel is gangrene *en masse* of the limb involved. Gangrene as a direct result of wound of the main artery of a limb occurred 9 times (22·5 per cent) in the 40 cases personally observed. In 5 of these (55·5 per cent) the popliteal was the vessel wounded, and in 1 of them the corresponding vein only was severed. In 2 cases (22·2 per cent) the femoral artery was involved. Two cases of gangrene of the forearm are included, one secondary to a lateral wound of the left subclavian artery in the thoracic part of its course, producing a hæmothorax, and also an embolus which was arrested at the bifurcation of the brachial artery. In the second case gangrene of the hand followed simple ligation of the brachial artery in its lower third; a very rare occurrence.

The third important result of trauma to a vessel is the formation of an aneurism. Aneurisms are of three types, viz. :—

- (1) Arterial hæmatoma: true traumatic aneurism.
- (2) Arterio-venous aneurism.
- (3) Aneurismal varix.

The presence of an aneurism may be detected by the signs of a wounded artery, a systolic bruit of blowing character which later may become a sharp whistle as the wound cicatrizes, and the absence of distal pulse. An arterial hæmatoma, on the other hand, gives a loud systolic bruit. In the case of a varix, a "machinery" murmur is present which is rarely

noted before the third or fourth day, when the primary clot is absorbed and the intima of the two vessels has had time to unite and become continuous. The bruit is usually of the highest note over the actual point of communication. The note is deeper as the length of column increases. The systolic bruit may, however, be very sharp and slamming in character, in fact almost of the sledge-hammer type.

As regards the course of an aneurism, spontaneous cure may occur both in the traumatic and varix types. This was the case in innominate and axillary aneurisms observed by the speaker. The most common course is steady contraction of the sac. Other complications, however, are not uncommon. The most important are :—

(1) External hæmorrhage, especially in wounds infected with gas gangrene.

(2) Internal hæmorrhage, also usually the result of infection, and characterized by enlargement of the sac.

(3) Hæmorrhage into a normal canal, e.g., œsophagus, trachea, larynx or fauces.

(4) Embolism, as cited in the case of the subclavian noted above.

Pressure effects, especially paralyses, are liable to occur, and these may be due to injury or concussion.

The treatment of aneurism resolves itself into one of two methods, viz., either ligation or suture.

Ligation may be performed at the point of injury, as in Esmarch's or Syme's operations. It is suitable for aneurisms in relation with the common femoral. In a case so treated, compression of the abdominal aorta proved of great value during the course of the operation. On the other hand, in a subclavian case, clamps failed to compress the innominate satisfactorily.

The treatment must always be dominated by the position of the wounded vessel. At the same time the danger of applying a proximal ligature to a varix should not be forgotten.

In practice the conditions favourable to complete extirpation of an aneurism are rare, unless a long period is allowed to elapse after the injury.

Suturing is also associated with many difficulties. These difficulties may be summarized as follows :—

(1) The nature of the wound itself.

(2) The stiffening of surrounding tissues and especially of the arterial wall.

(3) The wide separation of the ends in old cases.

(4) The question of infection.

(5) The fine manipulation required, and the danger of inducing thrombosis.

(6) The question of the ultimate vitality of the limb.

Captain H. C. SIDGWICK said: Two cases of secondary hæmorrhage occurred in patients in the Division of No. 12 General Hospital under my

charge as recently as three days ago, within a few hours of one another ; a short description of these cases may be of some interest.

One was a case of septic perforating wound of the foot ; the bullet had caused a comminuted fracture of the second metatarsal bone. The wound had been received on March 15. The patient was admitted on the 17th, and on the 19th the wound was drained and a drainage tube inserted. On the 21st the drainage tube was removed and a smaller one substituted, the wound being dressed daily.

On the evening of the 24th the patient had a sudden and profuse arterial hæmorrhage from the wound. A tourniquet was applied and under ether the blood was found to be coming up from the sole of the foot. In order to find and secure the bleeding vessel, it was necessary to remove the second toe and the fractured distal portion of the metatarsal bone, whereon the bleeding point in the plantar arch was easily found and ligatured.

The patient is doing well. In this case I thought it probable that either a sharp fragment of bone, or possibly the drainage tube, had caused ulceration of the wall of the artery.

The other case was one of a septic wound of the upper forearm. The missile had entered on the inner side of the elbow, and, passing downwards and backwards, had caused a large explosive exit wound involving the ulna.

The wound was received on the 14th inst., and the patient was admitted on the 15th. The wound was drained on the 18th. There was some swelling in the region of the anticubital space.

On the 24th there was a somewhat brisk hæmorrhage from the wound and the swelling in front of the elbow became much more tense. Under ether the large lower wound was first enlarged and examined, the clot turned out, and the ulnar artery found to be completely divided ; both ends were secured ; after this had been done there was still arterial hæmorrhage from the upper wound. An incision was made connecting the two wounds, and the lower part of the brachial exposed and found to be wounded laterally. After securing this the wound was quite dry.

This patient is also doing well and the circulation in the hand is satisfactory.

Lieutenant VINCENT TOWNROW gave details of a case previously mentioned by Colonel Sir G. Makins, where a rifle bullet was plugging the popliteal artery and vein ; this patient walked for half a mile after receiving the injury ; the bullet had entered just in the middle of the popliteal space, and X-rays in two places showed its exact position—the apex against the popliteal surface of the femur. At the operation for removal of the bullet, there was no hæmorrhage at all into the surrounding tissues ; on removal of the bullet there was at once severe hæmorrhage ; further opening of the wound showed both artery and vein to be perforated ; both were ligatured above and below. The after progress was uninterruptedly good and there was never œdema or threatening

gangrene, which bore out the statement of Colonel Makins, that ligature of the main vein at the same time as the artery did not increase the risk of gangrene. He also said he had had two cases of rupture of the brachial artery, both near the bend in the elbow. In one there was a transverse shrapnel wound in front of the humerus about one inch above the condyles. A false traumatic aneurism followed three days after the injury and caused impending gangrene of the hand—swelling, coldness and absent pulse; the artery and vein were seen at the operation to be both damaged, the artery completely torn across. Both were ligatured, in this case gangrene of the hand followed, largely due, in addition, to infection which was present in the original wound producing an infective oedema around the collateral vessels.

In the other case following an exit and entry wound on the anterior surface of the arm one inch above the condyle there was severe secondary hæmorrhage. At the operation there was a lateral rupture of the artery, which, though torn, still transmitted blood along the course of the vessel and produced a radial pulse; so demonstrating how an infective or non-infective embolus might be transmitted peripherally to the damage in the vessel. The artery was ligatured above and below the tear, and though septic blisters formed on the hand, no gangrene followed.

Mr. STRUTHERS thought that, in cases presenting a small hæmatoma with a small rifle wound, the wisest course was to wait until the surface wound had healed before surgical intervention was adopted. Unless this were done there might be a risk of infection of the sac, with disastrous results. The question arose as to whether it was not wiser to transfer such cases home rather than risk infection by operating whilst the wound was still open.

COLONEL MAKINS, in reply, said that he was not in the slightest disagreement with what Mr. Struthers had said. There is no need to interfere at all in the case of aneurism unless active symptoms develop. With some vessels, in fact, it is a manifest advantage to wait until collateral vessels have developed. This is so with the carotids, for example. On the other hand, some cases occur which cannot be let alone. Thus in one case of gun-shot wound through the thigh very extensive suppuration was present. In another, the aneurism was rapidly increasing in size coincidently with rise of temperature. If, however, an aneurism is stationary and the wound clean the case may be sent home. There are undoubtedly risks in moving these patients and transferring them to England. If it were not for the fact that military exigencies decide so much in the question of movement, one would treat cases of aneurism as one does in civil life and operate at the most convenient interval. Varices usually get well by themselves. This may take place any time, even as long as ten to fifteen years after the injury, as in a case investigated and definitely proved by Professor Osler. Unless, therefore, a varix is bothering a patient there is not the least reason to interfere.

Clinical and other Notes.

CEREBRO-SPINAL FEVER AND THE SPHENOIDAL SINUS.

BY MAJOR DENNIS EMBLETON.

Royal Army Medical Corps.

AND

CAPTAIN E. A. PETERS, M.D. CANTAB.

Royal Army Medical Corps.

PRELIMINARY ARTICLE.

WE bring forward the following cases to show that empyema of the sphenoidal sinus has a relation, and probably a causal relation, to the infection of cerebro-spinal fever. The spread of epidemic cerebro-spinal meningitis was originally considered to be different from that of other bacterial infections such as cholera and plague. It did not appear to start from a definite focus, and no traceable series of links could be discovered between the cases. It has now been shown that the bacterial infection spreads from person to person, giving rise to a rhinitis, similar to that produced by other "influenza cold" organisms. Of the infected people a very small percentage subsequently develop meningitis. What determines the onset of meningitis, or the resolution of the rhinitis, has not been ascertained. It has been regarded as being due to a variation in the virulence of the organisms or difference in the resistance of the individual. It seems important in this connexion to establish the path by which the meningococcus gains access to the meninges from the nasopharynx. There are two possible routes: (1) By the blood-stream, and (2) by the lymphatics.

With regard to the blood-stream route, it seems probable that the meningococcus very early gains access to the blood, as do all micro-organisms in bacterial infections. That the organism has been demonstrated in the blood and urine of people suffering from the disease is not important in this connexion, since the organism could as readily have obtained access to the blood from the cerebro-spinal fluid as from the nasal mucosa. What is of importance is that the organism has been demonstrated in the urine of people carrying the micro-organism in the nasopharynx and yet having no symptoms of meningitis. The organism, to appear in the urine, must be circulating in the blood-stream. So it is possible that the organisms may gain access to the meninges via the blood-stream.

With respect to the route by the lymphatics direct from the naso-

pharynx, we would bring forward the following points which we believe support this path of infection.

Post-mortem examinations of three fatal cases of cerebro-spinal meningitis:—

Case 1.—Nasopharyngeal mucous membrane very swollen and rugous. Sphenoidal mucous membrane injected; cavity full of glairy pus; ostia impervious to a probe. Osteitis of bone surrounding sinus; numerous pus cells present. No organism seen or cultivated from the bone. Deep congestion of the inner table of the skull; in the region of the sinus the dura mater injected; thick purulent lymph lying on the surface of the dura mater.

Case 2.—The same findings, but the meningococcus was readily demonstrated in both the pus cells in the sphenoidal sinus and in the bone.

Case 3.—The same findings, but in addition the organism was demonstrated in the cancellous bone, in which the inflammation was much more extensive and reached to the apex of the petrous bone.

In none of these cases was there any inflammation occurring in the cribriform plate, the ethmoidal, frontal sinus or the middle ears. The findings suggest that the meningococcus infection spreads from the nasopharyngeal mucous membrane into the sphenoidal sinus. The opening of the sinus is then obstructed by the swelling of the mucous membrane, which is very liable to excessive swelling in children and adolescents in the course of inflammation. The occlusion would be favoured by any abnormal contraction of the ostia or pathological change.

Subsequent to empyema of the sinus infection of the dura mater may supervene. So it might be suggested that among the contacts who have a mucosa infection, it is those who develop an empyema of the sphenoidal sinus who develop cerebro-spinal meningitis. It is accepted that a drop or two of pus in the sphenoidal sinus may cause death (Sir StClair Thomson), while the operation establishing drainage is not a serious procedure.

Fatal cases of sphenoidal sinus empyema usually develop cavernous thrombosis, clinically evident by proptosis of the eyes. In these cases the organisms present cause thrombosis. On the other hand, when the meningococcus infects an empyema in the sinus, thrombosis does not occur, and the meningococcus infects the meninges. The headache of cerebro-spinal fever is frequently referred to the occipital region to which the pain of sphenoidal empyema on manipulation is also referred.

Clinically, the carriers fall into two classes, typical examples of which are given: (1) Acute, lasting about three weeks, and (2) chronic.

Class 1.—Private —, a Canadian, who yielded practically a pure cultivation of meningococci from his nasopharynx. The mucous membrane of the nose and nasopharynx was swollen and red, and exuded a clear profuse discharge. The ostia of the sphenoidal sinus were

not located by a probe. Ung. hyd. nit. dil. 3ss., menthol gr. v, ol. olivæ ad. ʒi, was painted into the nostrils, and the tonsils were swabbed with lot. hydrogen peroxide. In three weeks a swab proved negative. The acute carrier may pass on to Class 2.

Class 2.—The chronic carrier does not exhibit the acute congestion of the nasal mucous membrane, and the organism is not always found, suggesting the presence of a reservoir which leaks from time to time. Case 1 is an instance of this condition. Though the patient was actually suffering from the disease, the same local signs appeared on rhinoscopic examination.

Three healed cases of cerebro-spinal fever were admitted from Tréport Stationary Hospital, and one of us (E. A. P.) examined them. The mucous membrane of the nose and nasopharynx was pale, dry and shrunken. Nasal obstruction in one case prevented location of the sphenoidal ostia, but in the other two the ostia were unusually patent, so that an empyema was almost impossible. It is credible that these men owed their recovery to this patency.

With these data in hand, one of use (E. A. P.) proceeded to drain the sphenoidal sinus in Case 1 (referred to above).

An extract from the notes of Lieutenant Rowlands, of the Welsh Hospital:—

—, aged 17, North Irish Horse, landed at Havre, August 21, 1914. December, bad cold, slight hæmorrhage from the lung. January 17, Rouen: tubercle diagnosed. February 14, admitted to Welsh Hospital, Netley, with "rheumatic pains"; apparent recovery. 23rd, when up and about, temperature rose to 104° F. (a cerebro-spinal carrier was subsequently discovered in the patient who occupied the opposite bed). 24th, severe frontal headache; erythematous rash; pain at back of neck. 25th, definite meningeal symptoms; increased reflexes; Kernig's sign present. Lumbar puncture revealed cerebro-spinal fluid under pressure and contained pus cells. No organisms discovered (Dr. Klein's report). Twenty-five cubic centimetres of serum were injected 28th. Meningococci grown from cerebro-spinal fluid. March 6th, patient has had in all eight injections of serum after lumbar puncture. Head still retracted. 7th, no growth from cerebro-spinal fluid. 9th, relapse; nasopharyngeal swab negative. 10th, autogenous vaccine (five millions) prepared by Dr. Klein was injected by Lieutenant Rowlands, hypodermically. 12th, soamin, five grains, injected intramuscularly. 13th, cyanosis. 17th, twitching; dusky hue; incontinence of urine; no growth from cerebro-spinal fluid. 20th, improvement, and lower temperature. 21st, another relapse; lumbar puncture, without serum injection. 25th, meningococci in nasopharynx. April 2, meningococci not found in nasopharynx. 3rd, pulse 110-120; generally better; occasional delirium. 4th, worse; lumbar puncture and serum. 7th, meningococci not found. 14th, meningococci were found in the nasopharynx; nasal treatment

with ung. hyd. nit. dil. 3ss., menthol gr. v, ol. olivæ ad. ʒi, painted into the nose. 16th, urotropine given; pulse 110. 30th, transferred to Royal Victoria Hospital on concentration of cerebro-spinal cases. Up to this time seventeen injections of serum have been given, but relapses still occur. May 3rd, chloroform was given by Lieutenant Adeney, and the sphenoidal sinus opened from the nose by one of us (E. A. P.); a dram of pus escaped from the left sinus. Neither ostium could be found with the probe, so the thin bone was broken down with Heath's small mastoid burr. Meningococci were found in the glairy pus. Subsequent history: The patient was rather better from the first day. There is now no retraction of the head, and Kernig's sign is only slightly present, but the pulse keeps up to 115-125. May 7, temperature up to 101° F.

Conclusions.

(1) Sphenoidal empyema is associated with cerebro-spinal fever in a causal manner.

(2) Cerebro-spinal fever is a meningitis due to organisms entering the meninges from the sphenoidal sinus by way of the lymphatics.

(3) Adults are less susceptible, owing to a diminished tendency to sphenoidal empyema, as they are not prone to excessive swelling of the mucous membrane and so to closure of the ostia as is seen in adolescents.

It may be advisable to open the sphenoidal sinus in all cases of cerebro-spinal fever. It is certainly advisable to treat the nasopharynx on the lines used for the acute carrier (Class 1, *ante*). We would register this paper as a plea for nasal hygiene in the case of recruits.

A CASE OF HYSTERICAL PARAPLEGIA.

BY LIEUTENANT ADOLPHE ABRAHAMS.

Royal Army Medical Corps.

C. G., A PRIVATE of the 1st East Lancs., was admitted to the Connaught Hospital, Aldershot, in September, 1914, suffering from paraplegia.

His history was that on September 8, 1914, whilst he was carrying food from a wagon to the firing line, a shell burst close to him and a companion who was close to him. He remembered the shell bursting and striking the wagon, but a period of unconsciousness of four or five days' duration then elapsed, on recovery from which he was suffering from a small wound in the left buttock and complete paralysis of both legs, with pain in the back in the region of the fourth lumbar vertebra, due in his opinion to the fall of a spare wheel of the wagon upon him.

According to his account, he suffered also from paralysis of the sphincters for eleven days after the accident. Whether this was so or not, control had certainly been resumed on his arrival in England on September 25. A note of his condition soon after admission states: "There is complete paraplegia below both hips. As regards sensation in the legs, there is complete loss to all forms of sensibility, including deep touch in the right leg below Poupart's ligament and behind as high as the iliac crest. In the left leg there is complete anæsthesia to all forms of sensibility of the foot, including the heel and sole. There is loss of sensibility to light touch all over the limb, but pain (pin-prick) is appreciated apparently normally as far down as the ankle, where there is an abrupt change to total anæsthesia. There is some weakness of the right arm and of the muscles supplied by the ulnar nerve, and there is anæsthesia to touch and pain over the area of distribution of the ulnar nerve in this hand. Sphincters normal.

Captain Stabb, Surgical Specialist to the Connaught Hospital, very kindly asked me to see the patient on April 20. The patient was a man, aged 25, of rather slow cerebration and slightly microcephalic, but of robust appearance. His previous history and family history, with the exception of one point which appears below, were quite indifferent.

On examination the lower extremities appeared to be in a condition of total flaccid paralysis. The knee-jerk was definitely present on both sides; that on the right side was on the whole slightly exaggerated. No plantar response was obtainable on either side. Cutaneous sensation was entirely absent in the right lower limb, doubtfully present in the left lower limb and in both arms. There was a suggestion on the whole of glove and stocking anæsthesia.

There was no evidence of trophic change in any part of the body; the electrical reaction of the muscles was not investigated. There was no evidence of any differences in the power or muscular condition in the upper extremities. Perfect control of the sphincters was present. The scar of a healed bullet wound was visible in the left buttock over the main trunk of the sciatic nerve.

Such a condition of affairs pointed almost beyond the slightest doubt to a functional paraplegia. A more minute cross-examination was not without interest in defining some cause for the condition of the nature of a psychic trauma. The companion by his side suffered a severe injury at the same time, his legs being blown off. At one interview the patient stated that he had actually *seen* the legs blown off; this he contradicted on another occasion, saying that whilst in hospital in France he had *heard* that this particular injury had occurred. Without absolute proof there was at least a strong suspicion of a pronounced psychic trauma. Furthermore, the circumstance that the patient has a sister who has been completely paralysed for years introduced an anxiety-

neurosis that the burden of an additional cripple upon the family should not be laid to his charge.

On April 30 the patient was anæsthetized with nitrous oxide. During the slight temporary rigidity which occurred, the lower limbs were seen to participate in the change. Before consciousness returned, the legs were flexed and placed in a position in which the change could readily be seen by the patient, who, upon the return of complete consciousness, was persuaded that the legs had moved during the anæsthesia, and commanded to replace them in a more convenient position. Slight voluntary movement of the thighs immediately took place, and suggestion was continued throughout the day, movements being encouraged against resistance which the patient did not realize. On the following day he was gradually raised to the vertical position and supported upright. At this stage his mental condition was one of resistance and resentment and reluctance to admit that any voluntary movement was possible. During the day the upright position was resumed at intervals, and the patient made to walk between two attendants. On the following day he walked alone. By this time his attitude of resistance had broken down, his movements were now made without any demonstration of the great exhaustion which characterized his first efforts, and he began to express interest and pleasure in his recovery.

Henceforth improvement was steadily progressive. His co-ordination and strength increased so that he was soon able to walk a hundred yards with a stick, and then unsupported. A pronounced hysterical element persisted, encouraged by the almost perpetual attention he received from visitors and other patients. When he left for an auxiliary hospital, on May 25, there was sharply defined hemianæsthesia on the right side throughout the body to light tactile sensation (cotton-wool) and to slight painful sensation. On the left side sensation throughout was perfect with the exception of a doubtful patch of anæsthesia on the dorsum of the foot, the sole and the plantar surface of the heel.

I am greatly indebted to Lieutenant-Colonel W. Turner, Commanding Officer to the Connaught Hospital, for his kind permission to publish these notes.

A FOLDING DHOOLIE.

MAJOR D. S. SKELTON.

Royal Army Medical Corps.

As regards the carriage of wounded in the operations in German East Africa, on my being ordered to organize and equip a mobile medical unit, I realized that the ordinary pattern of open stretcher would not be suitable for carrying white men any distance. The operations on the coast were being carried out under a blazing tropical sun, whilst any form of wheeled covered transport was in general impracticable. The ordinary Indian dhoolie is, in my experience, heavy and cumbrous.

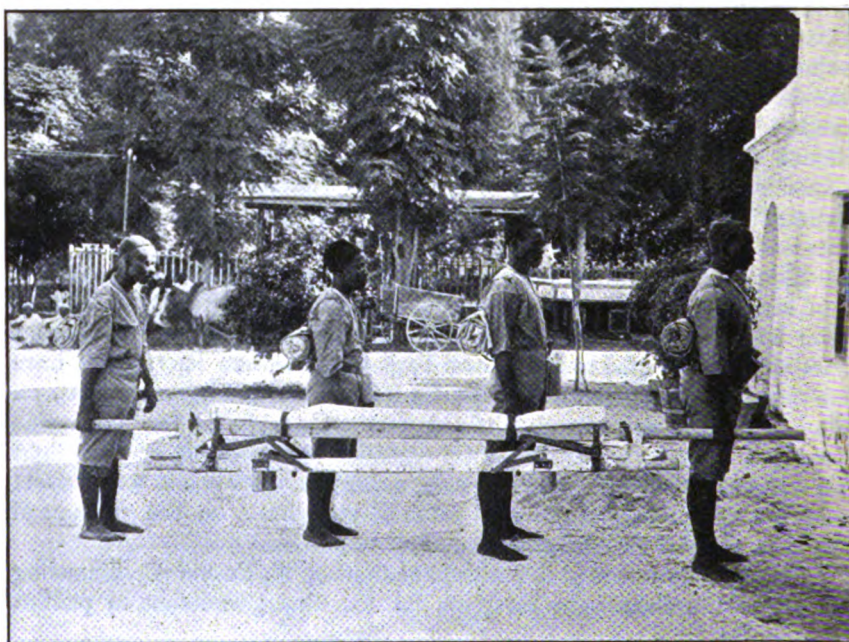


FIG. 1.

The accompanying photographs show the folding dhoolie which I devised for the Zanzibar Field Ambulance. Fig. 1 shows it closed, together with the method of carriage; and fig. 2 shows the way the Swahili stretcher-bearer carries it when loaded. It may be mentioned that in fig. 2 a strap should be shown which could be fastened round the chest of the wounded to prevent him falling out. Carried on the shoulder, as is shown in the photograph, the stretcher-bearers can march all day.

The stretchers were made in Zanzibar by local carpenters, and the iron work was executed in the Bazaar.

I have forgotten the exact weight, but so far as my memory serves me the extra weight amounted to about 6 lb. That this pattern of dhoolie

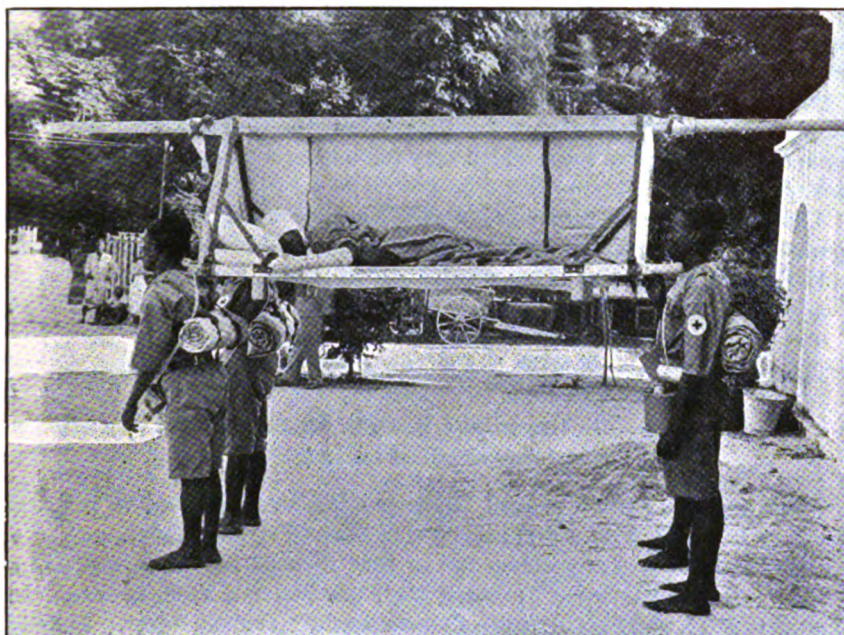


FIG. 2.

was approved of is evidenced by the fact that the Indian Field Ambulances accompanying the Expeditionary Force to East Africa requisitioned for some to be made and furnished to them, after the Officer Commanding had seen them working in the field.

AN INTERESTING CASE.

BY CAPTAIN J. H. DOUGLASS.

Royal Army Medical Corps.

GR. S. was given his third dose of "606" (0.6 gm.) on Saturday, June 20, 1914, his urine being normal and no contra-indications present.

On Sunday, June 21, at 10 a.m., he complained of headache with a temperature of 99.4° F., evening temperature 101° F. This condition was at first attributed to "606."

On Monday, 22nd, his blood was examined and subtertian malarial parasites were found in small numbers.

On Wednesday, 24th, at 8.15 a.m., he suddenly had an epileptiform fit, became dazed and unable to answer questions. At 10 p.m. he had another fit which lasted ten minutes, and at 4 a.m. on the 25th he had a similar fit. He died at 1.15 a.m. on Friday, 26th, his temperature running up to 108° F.

A post-mortem was held and subtertian malarial parasites were found in the choroid plexus of his brain and also in the spleen, which was enlarged.

The membranes of the brain were congested and a small breaking down area was found in the white matter between the temporo-sphenoidal lobe and the occipital lobe, which may have been a gumma; this is being investigated.

The case goes to prove that "606" has no curative action on the parasites of malignant or subtertian malaria, whereas according to French and Russian authorities it has on the benign tertian variety.

TYPHOID FEVER WITH SUPPURATING OVARIAN CYST.

By LIEUTENANT H. G. C. MOLD.

Royal Army Medical Corps (S.R.).

THE patient, a female, aged 22, unmarried, was admitted to hospital on May 12, 1915, with a preliminary diagnosis of typhoid fever.

She had not had any illness up to four months ago when she had a cough and was "feverish"; since then she has had amenorrhœa. In January, 1915, she was inoculated once against typhoid fever. Shortly afterwards she was wounded in the left shoulder by shrapnel, but the wound healed quickly.

The present illness began four weeks ago with diarrhœa and abdominal pain. She was feverish and was bleeding from the nose, but had no headache. When she was admitted she was well nourished, but looked flushed and feverish, her temperature was 100·8° F. and her pulse 120 per minute. Her tongue was coated with a thick white fur, but was moist. The abdomen looked full and was very tender and rigid, especially so in the right iliac fossa. On palpation a large firm smooth swelling was felt, extending from above the symphysis pubis to the umbilicus; it was almost central but was inclined slightly to the right. The swelling was dull upon percussion and there was no fluctuation. A catheter was passed, but only two ounces of highly coloured urine were withdrawn and the swelling persisted.

Upon examination *per vaginam* the cervix was found to be pushed far over to the left side and the uterus was behind the tumour and to the left of it. The tumour appeared to be distinctly to the right of the middle line and was very tense. There were no breast changes and the

other organs appeared to be normal. A blood culture was taken which proved to be negative.

The patient's condition remained much the same, with fever and a rapid pulse, until May 16, when she seemed to get worse; the temperature rose to 102.2° F., and she started vomiting. It was decided to operate and on May 17 a laparotomy was performed by Colonel S. Guise-Moores under ether given by the open method. A large unilocular ovarian cyst was found; this originated from the left ovary and its pedicle formed a continuation of the left broad ligament. There were some adhesions to the pelvic wall. The cyst was removed, leaving the ovary behind.

The cyst contained about two pints of a grumous semi-purulent fluid from which the *Bacillus typhosus* of Eberth was obtained in pure culture.

At 7 p.m. the patient was very feeble, her pulse was 140 and the temperature 100.8° F. A pint of saline solution was given *per rectum* and a hypodermic injection of digitalin $\frac{1}{100}$ gr. and strychnine $\frac{1}{80}$ gr. was given every four hours. She had a fair night without much pain, and on May 18 was better, her temperature being 98.6° F. and her pulse 120 per minute. There was no vomiting. A slight hæmorrhagic vaginal discharge was noticed and persisted for two days.

She made a rapid and uneventful recovery.

A CASE OF TETRAGENUS SEPTICÆMIA.

By LIEUTENANT HENRY ROBINSON.

Royal Army Medical Corps.

A SOLDIER of three years' service and aged 23 was admitted to hospital on March 18, 1915, complaining of pain in the feet of about six days' duration, with steadily increasing malaise, weakness, and anorexia. He had also a slight headache and a very slight cough. There had been some abdominal pain at the commencement of the illness, but this passed off before the man came under observation; on admission he was constipated, as is not unusual in men who have been a long journey on an ambulance train. He had not vomited. There had been no nose-bleeding nor sore throat.

The only account of previous illness was a fever of some kind in India about a year before. He had never had rheumatism. He had been three times inoculated against enteric fever, the last time nearly a year previously.

On admission he looked fairly comfortable; not flushed, no herpes. He was rather deaf, and in view of a subsequent occurrence it is regrettable that no inspection of the ears was made. The tongue was red at

the edges, furred in the centre. Temperature 103° F. The pulse-rate was 120 on admission, but dropped soon afterwards to under 100; regular, low tension, skin moist, no rheumatic smell.

On examination, nothing abnormal was found in the lungs. The heart's apex was just internal to the nipple in the fifth interspace. A soft blowing apical murmur was present, heard also at the basal region. There was no abdominal distension, gurgling, tenderness, or rigidity; and no spots. The spleen was doubtfully palpable. There was no swelling or redness of the feet, though they were tender when handled. A diagnosis of acute rheumatism was made, and twenty-grain doses of salicylate of soda with equal amounts of bicarbonate were given four-hourly, together with a brisk purge. On the off-chance of the case being one of enteric fever, blood was withdrawn from a vein for cultivation; it was submitted to Lieutenant M. K. Acheson, R.A.M.C., bacteriologist, who found it sterile. Under treatment the temperature fell rapidly and became absolutely normal after six days. On March 22 the man was much better in every way, and it is noted that the apical first sound was then almost normal, but still slightly impure. On the 26th the murmur was once more in evidence, though in other ways the patient has improved. On the following day salicylate treatment was discontinued altogether; the dosage had already been cut down as the symptoms ameliorated. The diet was cautiously advanced and absolute recumbency was maintained. On March 31 there was a slight nocturnal rise of temperature, and next morning a sudden return of pain in the legs and malaise occurred, together with a temperature of over 103° F. Soon afterwards a condition of apathy almost verging on coma set in. There was no swelling or redness of the joints. Large doses of salicylates were once more exhibited, but this time without the slightest effect. The cardiac murmur was still present. On April 3 the man complained of pains in the ankles, shoulders and spine; nothing abnormal was detected on examination of those regions. The temperature was 104° F., the pulse rate 128, and the cardiac murmur had entirely disappeared. No petechiæ or abscesses were present. A diagnosis of infective endocarditis was arrived at, a further sample of blood was taken for culture, and the salicylate was discontinued.

On the following day, April 4, the patient, who had originally been admitted into a surgical ward, was transferred to the medical division of the hospital; and until my own transfer, about three weeks later, I lost direct touch with him. During this time he was under the care of Lieutenant A. T. Todd, R.A.M.C., with whom I saw the man occasionally in consultation. The case notes were carried on by Lieutenant Todd, and I am indebted to him for the particulars of this part of the illness.

On April 4, on taking over the case, Lieutenant Todd's notes state that the man was slightly cyanosed, he complained chiefly of pain over the pericardium and base of the left lung. A double mitral murmur was heard

at the apex, which was tender. A cough began on this day, and patches of broncho-pneumonia were found in both lungs. The spleen was enlarged. Pulse 120, very weak and dicrotic. Temperature 105° F.: patient very delirious. Quinine sulphate in heroic doses was ordered.

Next day there was a distinct improvement. The cardiac murmurs were unchanged, but the temperature was lower, the pulse less weak and dicrotic; the cyanosis had disappeared. On April 6 the improvement continued, though there was still some nocturnal delirium. On April 7, it is noted that he felt better, though the pulse tension was still very low: there was copious mucopurulent expectoration. Lieutenant Acheson reported that the blood contained the *Micrococcus tetragenus*. By the 10th the temperature was normal, and the præcordial pain was much less; there was some blood mixed with the mucopurulent expectoration. On April 14 a general quinine rash was observed, and also a purulent discharge from the right middle ear; but the general condition was much improved, and the cardiac murmurs were no longer heard. On the 16th pleuritic pain was present on the left side and examination showed a small patch of consolidation, with crepitations and bloodstained sputum and a temperature of 100° F. Quinine was once more freely pushed. This attack soon subsided, though the sputum was still stained six days later, when the patient was feeling much better and asking for food.

About this time Lieutenant Todd left for the Front, and the patient came once more under my care; I found the heart sounds normal, cough practically gone, and, apart from weakness, hardly any morbid signs except aural discharge. From this discharge Lieutenant Acheson had cultivated a coccus which grew both in pairs and in fours; he was inclined to regard it as the same organism (*tetragenus*) as that which he had already recovered from the blood. On April 27 the patient developed slight femoral thrombosis on the left side. On May 5 it is noted that the ear had ceased to discharge, and the heart sounds were normal; but there was still tenderness, and a hard cord was still palpable along the line of the femoral vein. A few days later the patient was transferred convalescent to a hospital ship.

The exact sequence of events in the pathology of this case is not absolutely certain. The original attack seemed to respond satisfactorily, though not immediately, to salicylate treatment. It may have been true acute rheumatism; alternatively it is arguable that it was really even then a *tetragenus* infection. When the first relapse took place, the diagnosis of infective endocarditis supervening on a simpler rheumatic lesion seemed inevitable, and a bad prognosis was formed. The temperature chart alone would suggest a pneumonia, but it was only after two or three days of high pyrexia that cough and pulmonary signs developed. The middle-ear abscess may have been pyæmic in nature; it would have

been of great advantage in deciding this point if the ears had been examined for old perforations on the patient's first admission.

Fortunately, Lieutenant Todd had had experience of tetragenus pneumonia at the Royal Victoria Hospital for Sick Children, Edinburgh, where he had found quinine of great value; he had already adopted the same drug in this case before the bacteriological finding was known, and, in view of the upshot, it would be certainly worth while to treat any future case in the same way. Such text-books of bacteriology as are available on the spot here are practically silent on the pathogenicity to man of the *Micrococcus tetragenus*; and I was very fortunate to find in Lieutenant Todd a colleague with first-hand knowledge of the tetragenus pneumonia which occasionally attacks children. Even he, however, had not met with a case of blood infection by this organism; so I have thought it worth while to place this case on record in spite of the fact that I am not in a position to give any references to similar cases that may have already been published.

I tender thanks to Lieutenants Todd and Acheson for their valuable help.

A CIRCULAR TYPE OF BRICK INCINERATOR FOR CAMPS AND TEMPORARY HOSPITALS.

BY SERJEANT-MAJOR E. B. DEWBERRY.

Royal Army Medical Corps.

In the Journal for January, 1914, on pp. 86, 87, and 88, photographs and explanatory matter were given of an improved circular type of brick incinerator.

This incinerator with certain improvements has been given a trial in connexion with the camps and temporary hospitals of the Expeditionary Force, with excellent results.

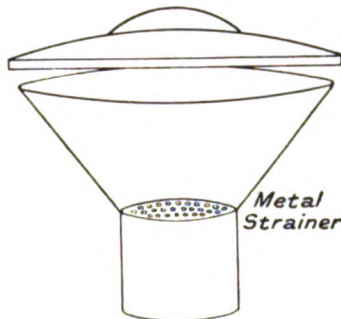
The incinerators shown in the photographs were in actual use on a camp at the time the pictures were taken. If these photographs are compared with those in the Journal mentioned above, it will be seen that a double row of bricks has been used in their construction; this was found to be necessary in order to cope with possible prolonged use, no bars were inserted.

Details of the construction of these incinerators are as follows:—

Number of bricks required to build incinerator with double						
walls	..	..	..	..	..	400
Height	..	..	..	..	..	39 inches.
Internal diameter at base	..	..	..	..	..	45 "
Internal diameter at top	..	..	..	..	..	24 "
Width of opening at base for clearing purposes (one opening						
on each side of incinerator)	..	..	..	..	..	12 "
Height of clearing opening	..	..	..	..	..	20 "

This type of incinerator, in addition to burning large quantities of ordinary camp refuse, was found capable of consuming ten latrine buckets of excreta daily.

The method adopted for mixing and burning the excreta is as follows: The urine is first poured off from the fæces into a straining receptacle; then a small quantity of camp refuse, ashes, etc., is placed in the bottom



of a "small" latrine bucket. To this some of the fæces are added, then more refuse and more excreta until the bucket is half full. The contents are then placed in the incinerator, which must be well alight. Good stoking is, of course, most essential. All urine is disposed of by pouring it through a metal strainer of a suitable size (containing straw).

Agricultural pipes should run from the strainer to the bottom of the pit, ten feet deep, eight feet long, and five feet wide, which is filled entirely with stones. When the straw from the strainer becomes foul it is burned in the incinerator. After the latrine buckets are emptied they are washed in a tub containing a solution of liquor cresoli saponatus fortis, using an ordinary closet brush for cleansing purposes.

Canvas clothing is supplied for the use of the men carrying out these duties, and extra duty pay at 8d. per diem is usually given them.

It may be of interest to add that the strata in the camp referred to where urine pits were dug was as follows :—

12 inches soil.

9 „ dark sand.

9 „ light sand.

Remainder consisted of chalk with an occasional mixture of flints.

NOTES ON ORGANISMS ISOLATED FROM THE BLOOD OF
CASES SUFFERING FROM SYMPTOMS SIMULATING MILD
ENTERIC FEVER OR PARATYPHOID FEVER.

By MAJOR C. F. WANHILL.

Royal Army Medical Corps.

DURING three years' laboratory work in Mhow a very large number of blood cultures have been examined, since blood has to be taken in all cases, not malarial, which have continued pyrexia. In many cases *Bacillus typhosus* or *B. paratyphosus* A have been isolated, in some several organisms grew on the plates which were obviously contaminations, but in some pure cultures of organisms which had not previously been associated with disease-producing organisms were recovered.

Among workers in the Tropics there has been a conviction for years that besides the recognized disease-producing organisms there are organisms which, given favourable circumstances, can get access to the blood and cause a septicæmia with symptoms similar to mild enteric fever. These diseases have been placed in the "pyrexia of uncertain origin" class and it is to this class of disease that most attention has been paid of late years. A discussion as to the number of diseases which have been identified and the causative agent discovered enabling the disease to be removed from the pyrexia of uncertain origin class is not indicated here, but the class is becoming smaller and smaller yearly owing to improved methods of diagnosis and to bacteriological research. There are, however, a very large number of cases which can be attributed to no definite disease, and it may be, as the following results of blood examinations seem to show, that organisms, ordinarily non-pathogenic, can under favourable circumstances become pathogenic.

Only the cases in which organisms were recovered in pure culture from the blood are given, and it is thought that such organisms may be reasonably supposed to have actually come from the blood and not to be contaminations, as these would probably show several organisms and not one only. It is, of course, impossible to prove the organism by injecting into another person, as a volunteer would be hard to find and the Government would not allow such experiments. The results are therefore regarded as indefinite and can only be proved by weight of

ORGANISMS ISOLATED FROM THE BLOOD OF PERSONS SUFFERING FROM "PYREXIA" SIMULATING ENTERIC FEVER OR PARATYPHOID FEVER.

No.	Glucose	Lactose	Mannite	Cane sugar	Dulcitate	Peptone water	Litmus milk	Inulin	Characteristics	Name and Date.
1	+	+	+	+	-	..	..	+	Motile; Gram-negative; agglutinations; <i>B. typhosus</i> and <i>B. paratyphosus</i> A negative; pure culture	Mrs. W—, 18.9.12. Agglutination with her own serum up to 1:200.
2	+	+	+	+	-	..	Acid and clot	-	Motile; Gram-negative; agglutinations negative; pure culture	Pte. C—, 23.9.12.
3	+	+	+	-	-	..	..	±	As above	Pte. D—, 23.9.12; Lce. Cpl. H—, 29.5.14.
4	+	-	+	+	-	Indol	Acid no clot	Acid ..	Small bacillus, very motile; Gram-negative; agglutinations; <i>B. typhosus</i> 1:100, <i>B. paratyphosus</i> A 1:200; pure	Pte. W—, 7.4.14.
5	+	-	+	+	-	..	Acid and clot	..	Very small, non-motile bacillus; Gram-negative; non-agglutinating; pure culture	Gr. G—, 10.3.14.
6	+	-	+	+	-	-	-	..	As above	Gr. E—, 12.11.12; Gr. T—, 12.11.12 (Y Battery R.H.A.).
7	+	-	+	+	-	..	..	+	Opaque colonies, non-motile; Gram-negative; no agglutination; pure culture	Pte. C—, 20.9.12; Gr. T—, 20.1.13.
8	+	-	+	-	+	..	-	-	no agglutination; pure culture	Pte. C—, 25.9.12.
9	+	-	+	-	-	-	-	-	Large bipolar staining bacillus, non-motile; non-Gram-staining; pure culture	Dvr. S—, 12.10.12; Bomb. R—, 24.9.12.
10	Acid	-	+	+	-	-	Acid and clot	..	Small motile bacillus; non-Gram-staining; non-agglutinating; pure culture	Lce. Cpl. B—, 30.4.13.
11	..	-	Acid	-	Acid	-	Acid	..	Small, very motile bacillus; Gram-negative; no agglutination; pure culture	Pte. G—.
12	..	-	..	Acid	-	..	..	..	Large opaque colonies; small, very motile bacilli; Gram-negative; no agglutination; pure	Dvr. S—, 22.11.12.
13	..	-	..	-	-	..	Clot bleached	..	Green colour	Five cases.
14	-	Acid	-	-	-	..	..	-	Firm, opaque colonies, not emulsifying; Gram-negative; agglutination negative ± motile	Pte. R—, 21.9.14.
15	Acid	-	-	-	-	-	Alkaline	..	Small bacillus ± motility; non-Gram-staining	..
16	-	-	-	-	-	..	-	-	or agglutinating; pure culture	..

evidence. The organisms vary also greatly in their reactions, are all non-pathogenic to guinea-pigs, and do not admit of any classification. In some cases it will be noticed that two cases, from which the same organism was isolated, were admitted to hospital from the same unit about the same time, indicating a common infection, and in one case, Driver S——, the particular organism (No. 9) was noticed first in a film made for malarial examination, and when a blood culture was made was also recovered from it. This seems an important piece of evidence, though of course not conclusive. The same organism was recovered from Bombardier R——'s blood, from the spleen of Corporal R——, who died of symptoms of food poisoning, and from the stools of Mrs. H——, who died with choleraic symptoms, all about the same time. This certainly seems to point to this being the causative organism.

The publication of these results may have the effect of bringing out the experiences of other bacteriologists in this line, and in this way some definite results may be obtained.

Sport.

THE JAMAICA TARPON.

BY COLONEL B. WILSON.

THERE are several ways of catching the tarpon of Jamaica, but they more often result in losing him after you have had a taste of his quality.

Perhaps this is one reason why tarpon fishing is such fascinating sport, and why the best and keenest sportsman that I know has never caught a tarpon at all, but kept his enthusiasm alight on the fights and runs and hair-breadth escapes by which he has lost them.

The tarpon is a western fish. *Megalops thrysoides* is, I believe, his name in the language of science, and his place is at the head of the herring tribe. The Gulf of Florida is where he mostly lives. There he is pursued with nickel-railed, plush-cushioned electric launches, Tarpon Club buttons, and automatic one-hundred-dollar reels, which play the fish themselves, and report progress on a gramophone. These devices give an exclusively American flavour to the sport, and ensure that no one can "come in" who is not prepared to put up a pile of dollars.

On the whole, I think, up to the present, we do the thing better in Jamaica. There is, however, in Jamaica, rather a tendency towards American methods. There are hotels run on American principles by American managers, with American manners, tourists'

agencies for exploiting the island and scenery by American methods. It would seem almost certain some live American citizen will evolve the idea of taking hold of the tarpon industry and making things hum, because he will guess there are almighty dollars in it. This, however, is a world of compensations and there are few clouds without their silver lining. In this case the silver lining consists in the sterling untrustworthiness of the information given to the tourist, the fierce rapacity of the hotel-keepers, the complete nonchalance of the negro gentlemen, who take your money but do not provide any bait, and the manners of the hotel staffs. These and other matters are enough to discourage anyone but an American millionaire from approaching the island with the idea of getting any sport there. The millionaire would probably be discouraged by the fact that he would not be likely to "put up a record" or catch the "biggest tarpon on earth" in the Jamaica waters, as the local tarpon is considerably smaller on the average than the same fish in the Gulf of Florida. Therefore, we hope that the poor wayfaring man may peacefully enjoy his sport here, whether as a soldier or civilian, for a few more years to come, before he is hunted out of it by the further advances of civilization among the variously coloured gentlemen of Kingston and other parts of Jamaica.

Now to return to the tarpon. They say that if you want to make hare soup, the first thing you must do is to catch your hare. I have never heard of anyone who did want to make hare soup, but the proposition would seem in a general way correct that no one (except a manufacturer of tinned food) could make it without catching a hare.

In tarpon fishing, however, the case is quite otherwise. Catching a tarpon is about the last thing accomplished by anyone who sets out in this pursuit. Many bites and runs generally go to a very few captures; still, like the partridges, they occasionally *will* fly into it, and we are sometimes cheered by a real solid tarpon absolutely landed. Such an incident naturally creates great excitement in fishing circles, and should the captor be a soldier of any kind, the camp and out-stations are in possession of the facts at a very early date. In fact, a movement to record each capture in Brigade Orders would probably meet with some support and would likely save a good deal of trouble.

As to the methods of catching the tarpon, they are scarcely worthy of this splendid fish. No dry fly will tempt him. He eats mullet, and is willing to accept it either dead or alive, or even cut

up into small pieces. He does not despise whitebait, or shrimps thrown overboard in handfuls like chicken food, and this indiscriminate feeding seems unworthy of a mail-clad robber baron of the deep such as he is.

The schemes for catching him, at least as pursued in Jamaica, are therefore fairly simple.

First there is bottom fishing or "still fishing" with dead mullet. This consists in using a dead mullet about herring size attached to a large hook, which is mounted on a yard or so of strong twisted steel wire trace, with a swivel connecting it to the reel line. The mullet is mounted by threading the swivel which fastens the reel line into the eye of a baiting needle. The needle is passed through the mullet from before backwards, entering by his mouth, or his gill, and coming out at his tail. The trace and hook are then pulled through the bait, till the hook is comfortably concealed under the gill. The trace is then connected up to the reel line and the bait hurled into the ocean, some fifteen or twenty yards from the boat, in six or seven fathoms of water. It is allowed to sink to the bottom and a certain amount of slack is pulled off the reel, and coiled, so that the fish which picks up the mullet may have plenty of time to cruise off with it and swallow it before the "strike" and before torpedo tactics begin.

Another method is fishing with whitebait, introduced, I believe, by Major Thorpe, R.G.A., and the officers stationed at Port Royal. Here you have a small silvered hook, hand made of special steel, attached to a very fine single wire steel trace. In this case tarpon have been induced to show themselves in the deep water under the boat, and handfuls of whitebait are dropped in from time to time. A dusky gleam of a broad side, or the wave of a huge tail like a propeller among these silvery morsels, shows that the tarpon are on the move. All whitebait are thankfully received *except* those attached to the wire. Sometimes, however, a competition occurs. Two or more tarpon are dining at the same table, a regrettable incident occurs, in fact someone snatches at the wrong whitebait. Then of course the fat really is in the fire.

The third and most sporting method is by what is called "live baiting." This is the scheme which is described in books on pike fishing. You get a strong mullet, and remembering the late Izaak Walton's advice about handling him as though you loved him, you pass a large hook through his back above the backbone and let him swim off, having first attached the hook to a strong but pliable twisted wire trace with two or three swivels. The wire

trace is attached to the reel line, which at the junction is buoyed by a float made, say, of two or three wine corks on a piece of wire.

You pay out some thirty or forty yards of line, and let the bait float down stream. (This style of fishing is usually done at the mouths of rivers.) Should you be lucky, and the large tarpon are on the feed, you may expect sooner or later a marine explosion, like the touching off of a contact mine, somewhere near your float, and almost at the same time a huge tarpon like a bar of silver hurls himself in the air, and bolts for the open sea, while you are hoping that your reel will not fuse with the brake friction. If your luck holds and your connection with the fish endures, you may "stay for the large show," and you can rely on not having a dull moment for the next hour or two—whether you defeat him, or he defeats you.

Live bait is, however, very difficult to procure. Native fishermen will trudge five miles, two or three days a week, to supply you with information of the number and appalling magnitude of the tarpon in their neighbourhood. Mullet are to be found in shoals close round these shores, and the fishermen are all experts with the casting net, which is the universal implement of mullet capture. Yet when you get up at 4 a.m. and arrive on the scene of action, you are more than likely to hear that "Gaint get no beat, Sah"—the method of informing you that the dusky gentleman either could not, or would not, but in any case did not, take the slight trouble necessary to get a supply of live bait.

This difficulty is avoided in Kingston Harbour by rowing up to the market wharf and going to the fish stalls at 6 a.m., when the fishermen are swiftly paddling in, in their canoes, over the dark, mirror-like waters of the harbour just before sunrise with their all-night catch. Here you buy your mullet. Doubtless they think you are going to eat it or some such thing, as otherwise it probably would not be supplied; however, as a rule you do get it, and pull out over the placid waters to anchor some 100 yards off the wharf, in the track of the moving tarpon.

This early morning on the water is the most delightful part of the Jamaican day. The sun has not yet risen over the dark mass of the Blue Mountains encircling the town and the waters of the bay. The gorges and ravines look black, and the dark blue masses of the range are clear cut and clean in the still and early light. A filmy veil of smoke-like cloud still clings to some peak or ravine. Behind, the sky is luminous, glowing primrose with the promise of the sunrise. The placid water of the bay mirrors the filmy

pearl-coloured sky of dawn. The far-off Palisadoes are outlined already by a fringe of living green, showing where the mangrove meets the water. Some little island schooner which has been beating up during the night, with the sails lit to an intensity of white by the first rays of sunrise, sits motionless in a mirage of pearl, outlined above the far horizon of the water. Closer in you see the fishing boats with piled wet nets, sharp cut like black gondolas in the clear and early light, pushing into market through the stillness of the dawn, though at hand, as you scan the water, you see an oily roll of some great fish like a porpoise. No, not a porpoise, the long black fin showing above the water marks it our friend—the tarpon. So here we drop the “killik” and bait up our hooks, and sling them overboard, while the fisherman cuts up others to throw round for ground bait.

Of course, after a time this kind of thing gets monotonous; besides, the sun is up and getting hot; things are not looking so dewy fresh as in the early dawn. Well, the one infallible thing to do is to let the tarpon take you at a disadvantage. Lay down the rod, get out your pouch and light a pipe. “Exactly! I knew it would.” No sooner have we produced pipe and pouch and begun to light a match, than the coil line begins to disappear, fold on fold over the edge—10, 15, 20. Now for it, and we jam the brake on the reel to strike, or as our dusky brother, the boatman, says, “Hit him good, Sah!”

Then the extasies begin. The reel screams, the line swings up towards the surface about seventy yards off, a submarine mine explodes and a great fish glittering like a bar of silver in the morning sunlight, springs in the air. He shakes himself like a terrier in his fury. Another and another spring. You see the bait hurled far from his wide-open jaws, like the black inside of a camera. You can almost see his bristling fins quiver in the extravagance of his fury. Then the vision is “lost and gone for ever”—

“The water wild went o’er his child,
And he was left lamenting.”

But, supposing Kismet is propitious and you have “Hit him good, Sah.” Then comes the struggle. Your tarpon bolts for the deep and the real fight commences. Well, it would need an abler pen than mine to picture it. Salmon I have caught and mahseer, sea trout and Loch Levens; but in my humble judgment none of these can touch the tarpon. No, there is only one creature that I know of, East or West, which is fit to stand beside him, in

stubborn courage, in dynamite energy, and in the joyous and volcanic fury of his rushes; his only peer is the "good old pig," the "mighty boar." They at least have their tribute in this, that whether you are sliding off your foam-flecked and blood-stained Arab, among the hot yellow jungle grass of the Ganges Kadir, to look on the grey and bristled one, "tremendous still in death," or watching the Jamaican negro heave the great silver fish on to the landing-stage—you are sorry you killed them both.

Reviews.

GUN-SHOT INJURIES. By C. G. Spencer, M.B.Lond., F.R.C.S.Eng., Major, R.A.M.C., Professor of Military Surgery, R.A.M.C. College, London. Published by Oxford University Press, 1908. Price 5s.

This small monograph is intended to meet the demand of a short introduction to the subject of gun-shot wounds.

The first part deals with the mechanics of projectiles, then comes a chapter on the general characters and effects of gun-shot wounds, while following this are chapters on wounds of vessels, nerves, bones, joints, head, spine, neck, chest and abdomen. There are seventeen plates and twenty figures.

The whole is a most excellent introduction to this most important subject.

W. A. S.

THE ACUTE ABDOMEN. By Wm. Henry Battle, Senior Surgeon, St. Thomas's Hospital. Second and Enlarged Edition. London: Published by Constable and Co. Price 10s. 6d. net.

This well-known book has been increased in size, and many case reports and illustrations have been added.

The special section on the after-effects of abdominal injuries is most instructive.

It forms a very complete monograph on the subject of acute abdominal conditions.

W. A. S.

PRACTICAL TROPICAL SANITATION. W. Alex. Muirhead, Serjeant-Major, R.A.M.C., Assistant Instructor at the School of Army Sanitation, Aldershot. London: John Murray, Albemarle Street, W. Price 10s. 6d.

This book has been compiled, as the author states, to meet the needs of a fast growing body of men who require a text-book above the standard of elementary tropical hygiene, yet below the standard manuals on tropical medicine for medical officers.

The writer was formerly on the staff of the Sanitary Officer, West African Command, Sierra Leone, and is therefore well qualified to judge of the knowledge which is requisite for men taking up service as sanitary inspectors in tropical or sub-tropical climates. The certificate of competency now demanded by the Colonial Office from candidates for such posts could well be gained by anyone conversant with this book. The subject matter has been kept as free as possible from technical language,

so that a reader of average general knowledge should grasp the meaning without difficulty.

The contents are divided into twelve chapters (244 pages) and an appendix, which contains a collection of useful miscellaneous information.

The last chapter of the book, on Sanitary Law and Practice as applied in the Tropical Colonies, should prove of very great value to newly appointed inspectors, for it contains a résumé of the practical routine carried out day by day, with various samples of returns and reports which it is necessary to render.

The book is well printed and contains 114 graphic illustrations.

It can be recommended with confidence as a readable and useful guide to those for whom it has been compiled.

P. F.

Current Literature.

Pathogenic Properties of *Bacillus proteus*.—W. P. Larson and E. T. Bell (*Journ. Exper. Med.*, June, 1915) have studied, among other apparently non-pathogenic strains of *B. proteus*, five strains obtained from human lesions, four of which were the only organisms present. These proved pathogenic for rabbits, rats and guinea-pigs, producing either simple abscesses, proliferative lesions, or a mixed exudative or proliferative lesion. The proliferative lesions consist mainly of epithelioid cells, apparently of connective tissue origin. No giant cells of the Langhans type are present, but multinucleated cells and fused epithelioid cells were observed. The histological type of the lesion does not depend upon the strain employed; neither does it bear any relation to the clinical severity of the case. *Proteus* cultures lose their virulence rapidly when grown on artificial media, but a non-pathogenic culture may be made pathogenic by inoculation into the anterior chamber of the eye, or by the use of aggressins. Subcutaneous inoculation produced simple abscesses; the proliferative and mixed type of lesions were best obtained by intra-peritoneal inoculation. The authors conclude that the *proteus* bacteria probably play a more important part in human pathology than is generally believed.

C. J. C.

Cultivation of Bacteria free Vaccine Virus.—H. Noguchi (*Journ. Exper. Med.*, June, 1915) having selected a vaccine lymph free from spores, emulsifies it in sterile saline, and by shaking in contact with ether for about twelve hours secures bacterial sterility. The emulsion, which has been reduced in vaccinal activity to about one-fifth of its original strength, is now inoculated into the testicular parenchyma of a rabbit. The virus multiplies in the testicle, reaches a maximum about the fourth or fifth day, and diminishes after the eighth day. The testicular substance is inoculated into the testis of another rabbit and so on, until after several transfers the virus becomes adapted to the testicular epithelium and is of an activity equal to that of a skin strain. The pure strain of virus thus obtained can easily and economically be propagated in the testes of rabbits or bulls, and should supply an ideal form of virus for the vaccination of human beings.

C. J. C.

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~~Communications.~~
ERRATA.

VOL. XXIV, No. 5, May, 1915: In the article on "The Prevention of Frost-bite and other Effects of Cold," by S. Delépine, on p. 401, first line, read: "and the colour darker"; p. 401, twelfth line from bottom of page, read: "proved" instead of "roved"; p. 411, fifth line, read: "metacarpal" instead of "metatarsal"; p. 419, Table VIII.—C, third column from right, read: "28-30" instead of "20-30."

BEING AN ACCOUNT

DEPOT, 1908-11.

By MAJOR¹ D. HARVEY.
Royal Army Medical Corps.

SINCE the days of Eberth and Gaffky it has been recognized that the causal agent of enteric fever, the *Bacillus typhosus*, is excreted in the fæces and urine of patients suffering from the disease; yet the full significance of this fact was only realized a few years ago.

Robert Koch, who has taken up no subject without illuminating it, was the first to draw attention to the danger of prolonged infection in typhoid fever. Koch's final dictum was, that the typhoid patient and not soil or water was the nursery of the germ; and he regarded the bacillus excreter as the sole cause of the disease, be it directly or indirectly.

This opinion of Koch's revolutionized the methods of prevention of enteric fever, as it directed attention to man as the store-house of the virus, and relegated the intermediary to its true subordinate position. Before entering upon the discussion of the subject of this essay, namely, the Causation and Prevention of Enteric Fever in

¹ Now Lieutenant-Colonel.

Military Service, it will be well to review briefly the work that has been done in civil life, and more especially in Germany, with regard to the rôle of the carrier or infected person. The carrier has been defined as a person apparently in good health and who is yet excreting the germ of typhoid fever.

Horton-Smith, in his Goulstonian Lectures of 1900, drew attention to the fact that the *B. typhosus* is excreted in the urine of typhoid patients both during the fever and in early convalescence. He found this condition present in about twenty-five per cent of his cases.

The writer has found that this percentage varies in different epidemics, and that it may be as high as seventy-five per cent, if the cases are examined daily during the fever and for a month thereafter. But, as will be shown later, the *chronic* urinary carrier is a very rare phenomenon, among young men at any rate (0-1 per cent of all convalescents at Naini Tal Depot, India).

Koch's original plan of campaign was directed towards rendering the typhoid patient innocuous by disinfection of the excreta both during the disease and in convalescence, and also to wards the detection of ambulant and abortive cases, especially of those anomalous types met with in children. For this purpose bacteriological stations were instituted in the most heavily infected districts. The discovery of the typhoid carrier was a natural sequence of the systematic bacteriological examination of the excreta of all convalescents carried out at these stations.

These carriers were found to fall into two classes:—

- (1) Those who only passed the bacillus for a few weeks, i.e., temporary carriers.
- (2) Those who became permanent excretors of the bacillus, chronic carriers.

The French writers classify carriers as follows (Sacquefee, 1910).

(1) *Porteurs précoces*.—Those who excrete the bacillus in the incubation period.

(2) Persons who have suffered from enteric fever and excrete the bacillus for varying periods:—

(a) *Porteur convalescent*.—In whom the excretion ceases before the end of the third month.

(b) *Porteur chronique*.—In whom the excretion lasts for an indefinite period.

The main result of the German work was to show that in a mixed population about two to three per cent of enteric cases become chronic carriers, and that eighty per cent of these

chronic carriers are women, but of the "temporary" carriers the greater number are found among the more youthful patients, males and females being in about equal proportions.

Klinger, one of the German workers, is of opinion that the majority of cases of enteric fever are due to pre-existing cases, but it must be remembered that when this work was in progress enteric fever was practically epidemic in his district. It is the purpose of the writer to show that the condition of endemicity which prevails in military service, in India at least, is maintained by the carrier.

With much of the German work I am in agreement, but as the experience of the writer has lain almost entirely with enteric fever among young men it is obvious that there is room for considerable difference of opinion. For instance, the German workers are agreed that the majority of cases of enteric fever are infective during the incubation period. This is quite contrary to the experience of the writer.

This point was very thoroughly investigated by the members of the Government of India Enteric Inquiry, and in no case was the *B. typhosus* recovered from the fæces or urine before the end of the first week or beginning of the second week of the fever. The writer has continued this line of investigation, and in over one hundred cases has examined the excreta at the very earliest possible opportunity, and his results go to confirm the view that the *B. typhosus* does not appear in the excreta of the patients before the sixth day of the fever.

The German conception is that the bacillus enters by the mouth, passes through the stomach to the small intestine, where it multiplies rapidly, and is excreted in the fæces; finally, it, as it were, overflows into the lymphatic system and blood-stream and gives rise to the constitutional symptoms.

The writer prefers the view that the germ enters by the mouth and gains a footing in the bile passages, where it multiplies and invades the lymphatic system and blood-stream, giving rise to the constitutional symptoms of an attack of enteric fever.

The writer has examined several cases daily during the fever from the day of admission and until three months after deferescence and failed to find the *B. typhosus* either in the fæces or urine, although it had been recovered from the blood.

It has been stated that Conradi and Mayer have isolated the bacillus from the fæces during the incubation period. Conradi's cases are as follows :—

Typhoid fever broke out in a household of eight in family ; the mother and three children were attacked. On April 20 the cases were brought to hospital, having been nursed up to that time by the grandmother, aged 61. Typhoid bacilli were recovered from the fæces of the grandmother on May 8, and eight days later she developed the fever. Is it not possible that the grandmother was a chronic carrier, that she had infected the others, and had herself become reinfected by her own bacillus enhanced in virulence by its passage through the more susceptible persons?

However it may be in a general population, all bacteriological evidence is against the opinion that young soldiers are infective during the incubation period or even during the first week of the fever.

Another point that may be traversed with regard to the German work is, that many of their "acute" carriers, i.e., people who gave no history of a previous attack of enteric fever and yet were found on isolated occasions to be excreting bacilli of the typhoid group, were carriers of the *B. paratyphosus* B.

Now, Klinger states that this same bacillus is frequently present in the intestinal tract of pigs. Obviously, then, he was not differentiating between the *B. paratyphosus* B and the *B. suis* *pestifer*, and thus much of his work requires revision.

The writer has examined 30,000 samples of excreta of convalescents from enteric fever and paratyphoid fever (A), and yet in no instance has he recovered the *B. paratyphosus* B. It will thus be seen that although military workers are immensely indebted to the German scientists for the lead they have given, yet the results of our work must not be expected to tally in every respect with work done in other parts of the globe, even though it proceeds along identical lines ; and I, for one, am not prepared to accept their findings *in toto* ; indeed, their earlier work has already been revised in several particulars.

To quote one instance. Schiller, in 1908, reported on a milk-spread epidemic. He found that one woman in the dairy was a chronic carrier, and that seventeen others, out of forty, were temporary carriers. The chronic carrier was isolated and subsequent examinations of the temporary carriers (?) were negative.

It appears to the writer that a possible and, indeed, probable explanation of the above extraordinary findings was that the faecal samples had got contaminated by the samples from the carrier before examination. This is also suggested by the fact that in some instances both the urine and the fæces of the others were positive.

The writer has seen no fewer than five samples of *fæces* positive for typhoid in one morning out of ten men under examination, and yet on investigation it was found that only one of these men was really a carrier; the others in some extraordinary way had unintentionally taken samples of the carrier's *fæces*. This was proved by segregating the men in hospital and by careful comparative agglutination and opsonic tests of the strains isolated. If such a state of affairs is possible in a military depot it must be much more so in civil life, where all samples are collected and sent in by the people themselves. If my positive results had been accepted as correct, a very pretty story could have been made, showing the presence of temporary carriers among those associated with a chronic carrier.

It is proposed in this paper to treat the subject from the standpoint that by "carriers" is meant not merely chronic carriers, but all infected persons or bacillus excretors, apart from the actual diagnosed case of enteric fever in hospital.

At present in some quarters a very narrow-minded view of the carrier question obtains; and many would confine the term to the person who has had enteric fever and who continues to excrete the bacillus indefinitely, and who at the same time is employed in the preparation of food. Beyond this conception they cannot go, and if the causation of a case of enteric fever cannot be traced to such a person, the carrier theory is dismissed, and "flies," "water," etc., are invoked. If one is to be confined to such a view of the carrier question then little indeed could be written from the military side, although the writer is perfectly well aware of the danger involved in the employment of such a person in cook-houses or stores.

A case illustrative of the narrow-minded view held regarding the carrier may be quoted from the annual report of one of the ablest and most energetic sanitary officers in India. This officer was called upon to investigate a small epidemic of typhoid fever which had occurred in a Gurkha Regiment. The strong point of his report was, that as each man cooked his own food these cases could not have been caused by a "carrier"; and he added, somewhat gratuitously, "therefore, in my opinion, some other cause apart from the chronic carrier must be looked for to account for the majority of the enteric fever cases in India." Yet in his recommendations made with the view of preventing the occurrence of similar epidemics, he advised the erection of a barbed-wire fence around the source of the water supply. To what end, if not to

prevent the contamination of the water by the discharges of infected persons, *i.e.*, carriers? That is to say, in one breath he dismisses the carrier theory, and in the next acknowledges that the epidemic under investigation had been caused by some such person. His only recommendation was directed against the very cause which he had previously declared negligible.

In another Report we read, "Infection of the water supply may be ruled out of court. Only preserved milk is used in barracks, and there was no suspicion of the presence of 'carriers.' As in past years, suspicion points to articles of food, such as ice-creams, fresh fruit and unwashed vegetables." The fruit, it is added, "may have undergone *much handling*," surely by "infected persons" is here understood.

If one is allowed to take a broad-minded view of the term "carrier," and to regard it as including all infected persons or bacillus excretors, I can at once formulate the thesis which it is the purpose of this paper to prove, namely, that all cases of enteric fever (and under this term are included the paratyphoid fevers) in military service are caused by contact with infected persons either direct or indirect.

Infected persons may be divided into the following classes :—

(1) Those actually suffering from enteric fever and who are excreting the bacillus in their fæces or urine or in both. (a) Recognized. (b) Unrecognized.

(2) Persons who have recently passed through an attack of enteric fever and are excreting the bacillus in their fæces or urine or in both. Temporary carriers.

(3) Persons who have had an attack of enteric fever more than six months previously, and are still excreting the bacillus in their fæces or urine or in both. Chronic carriers.

The relative importance of these three classes in the causation of enteric fever will be discussed later, but it may be said here that in the opinion of the writer Class 2 is the most prolific cause, followed by Class 1 (b) and then Class 3.

Many instances might be quoted from the literature on the subject showing the infectivity of the carrier, and reports of many epidemics caused by such persons have been published, but in this paper I intend not merely to submit a compilation, however complete, but rather to record instances and furnish evidence which have been the subject of personal investigation and observation.

To show the danger of the unrecognized case of enteric fever

the following instance is given: While working upon the question of enteric fever in Poona, the writer was asked to investigate a small epidemic of enteric fever which had occurred in the Convent School in that city. This school was kept by nuns and was most beautifully clean and neat in all particulars. There were two hundred boarders, some of whom were Eurasians, and some native Christians. Twelve cases in all had been notified, and these cases were divided into two groups. One group of six occurred towards the end of June and they were all admitted to hospital within a few days of one another. The children in the second group were admitted to hospital around and about the middle of August, or just over a month after the last case of the first group was admitted, thus eliminating the possibility that the second group had been caused by the first. The Eurasian children and native Christians were accommodated in different dormitories, and had separate dining rooms, but the food was the same and was prepared in one cook-house. Both classes of children furnished some cases in each group.

This epidemic had already been investigated, but all inquiries had been directed towards the intermediaries, such as the water supply, flies, latrines, etc., and a public latrine situated in the street near the school had been condemned and closed, but no cause for the cases had been discovered.

On inquiry I found that the cook of the establishment, a Goanese, had suffered from fever with "severe pain in the right side" in the month of June, about three weeks before the first case was taken ill. He continued to do his work, but eventually asked and obtained permission to go to his home. He left the school on July 1. On August 1, he returned to duty and resumed work, and a fortnight later the first case of the second series was taken ill. In September, when I saw the man, he looked thin and ill, but had no fever, and did not at that time complain of pain. I examined his blood serum and found that it gave a positive reaction, although not complete, in a dilution of 1 in 500 with the *B. typhosus*. There was little doubt, then, that this man had recently passed through an attack of enteric fever. As, at the time I saw this man, six weeks had elapsed since the last case of fever had been admitted to hospital, I did not expect to find that he was still infective, as had he been so there would be no reason for the cessation of the epidemic. I examined his faeces and urine daily for three weeks, but always with negative results.

Early in October he was suddenly seized with very severe pain

in the right side, and was admitted to the Civil Hospital, but still all examinations of his excreta were negative. A curious and interesting phenomenon was, however, noted in regard to his Widal reaction: a *complete* reaction was now obtained in a dilution of 1 in 20,000 as compared with the incomplete 1 in 500 obtained a few weeks earlier. On this second occasion the agglutination was complete in the 1 in 2,000 sedimentation tube before the end could be sealed off in the flame. I take it that he was suffering from an obstructive inflammatory lesion of the gall-bladder due to the *B. typhosus*, and that the inflammation was sufficiently intense to prevent the excretion of the bacillus, although at the same time it raised enormously the titre of his Widal reaction. I hoped when this acute inflammation had subsided to be able to recover the bacillus from his fæces, but he ran away from hospital to his home in Goa, and consequently I was never able to complete the chain of evidence.

Officers have spoken to me regarding this epidemic, and have objected that there was no direct evidence that this man was the cause. I admit this, but am confident that had this man's case been recognized as enteric fever, and had he been isolated at once, there would have been no cases in the school.

It may be urged that this man was not a carrier in the strict sense of the term; but this paper is written with the intention of obtaining a broad-minded view of the carrier question, and the writer would include under the term "carrier" all bacillus excretors who are not definitely diagnosed cases of enteric fever isolated in hospital. I believe it is only by taking such a view that the true importance of the carrier, or infected person, will be recognized as the essential cause of all enteric fever, and it is not till this is recognized that prevention can proceed along the right lines to a successful issue.

A second instance of the danger of the unrecognized case of enteric fever is quoted. At another station in India, where I happened to be stationed in 1908, a sudden explosive epidemic occurred among the boys in a school; ten boys in all were attacked and all were boarders. This epidemic was inquired into by the Acting Sanitary Commissioner, who in his report stated that he attributed the cases to the drinking of unboiled lake water. There was no evidence to show that the lake water was specifically contaminated, and the other two hundred boys in the school remained healthy.

In the next year, 1909, and about the same time of the year,

another small epidemic broke out in the school. This epidemic was investigated by Major E. D. W. Greig, I.M.S., and the writer. The Widal reactions of all the natives employed in connexion with the food supply were estimated, and one man was found whose blood serum gave a strong positive reaction. On inquiry, it was found that in 1908 this man had suffered from "pneumonia," but although very ill had remained at work for at least a fortnight before he left the school to go to his home. About a fortnight after he was taken ill the first cases in 1908 were admitted to hospital. This man did not return to the school until the summer of 1909, and he took up work again just before the next epidemic started. His excreta were carefully examined for ten days, but with negative results, and although I have little doubt that he was the cause of the 1908 cases, it is difficult to see how he could have caused the 1909 epidemic, for this reason; if he was the cause of the 1908 cases he must have been a chronic carrier for over a year, and in my experience men who have been carriers for that period do not suddenly and spontaneously cease to be so. He might, of course, have been an intermittent carrier, and this is possible, as his excreta could only be examined for ten days.

The sanitary arrangements in this school were very primitive, the latrines being built on to the cook-house, which adjoined the dining-hall, and any infected person in such a community would, of course, be a very real danger. An interesting fact was that one of the boys had paratyphoid fever (*B. paratyphosus* A) in 1908 and enteric fever (*B. typhosus*) in 1909, proved by blood culture.

One of the most fruitful causes of enteric fever (*B. typhosus*, but more especially *B. paratyphosus* A) in military service is the unrecognized case discharged early from hospital while still infective, i.e., the temporary carrier. Several instances of this have come under my own observation, and one or two may be referred to now, as the writer is of opinion that this particular type of infected person has been the cause of much of the enteric fever in military service, in India, at any rate.

In 1910 a small outbreak of enteric fever (paratyphoid A) occurred in a camp near Naini Tal, U.P. The men had come up from Lucknow for the hot weather and had been in the camp for five weeks before the first case was signalled. Four cases were admitted to hospital in one week and were diagnosed paratyphoid fever by blood culture.

500 *The Causation and Prevention of Enteric Fever*

The strength of the troops in camp was as follows:—

				Officers	Men
Infantry	..	..		2	78
Cavalry	..	..		2	72
				4	150

				Name	Corps
Case 1	..	May 6	..	Private D.	8th Hussars
" 2	..	" 7	..	" M.	"
" 3	..	" 11	..	" R.	"
" 4	..	" 8	..	" G.	H.L.I.
" 5	..	" 12	..	Corporal T.	8th Hussars
" 6	..	" 17	..	Private B.	"
" 7	..	" 25	..	" W.	"
" 8	..	" 29	..	" S.	"

Previous to the outbreak the urine and fæces of all natives employed in the camp had already been examined, and all with negative results, although in several instances bacilli were met with which were agglutinated at once by paratyphoid serum, but were proved subsequently not to be true paratyphoid bacilli. Such bacilli are extraordinarily common in fæces, and it is peculiar that the serum which is most often at fault is that for paratyphoid A. Only occasionally are bacilli met with which are agglutinated by typhoid and paratyphoid B serum and which are not true *B. typhosus* or *B. paratyphosus* B. The Widal reactions of all the men in camp were estimated, and as all had been inoculated the results are of interest.

Bacillus typhosus.

86, that is 65 per cent, gave a distinct reaction 1 in 100.
 33 " 25 " " " " 1 in 40.
 14* " 10 " gave a negative reaction.

* Five of these had been inoculated two years before and nine about one year.

Only two were found whose serum agglutinated the *B. paratyphosus* A, although dilutions of 1 in 10 were employed. The serum of one of these men gave a very strong reaction—indeed, the strongest reaction met with in the writer's experience of about two hundred cases of paratyphoid fever—and, in addition, the opsonic index of this man for *B. paratyphosus* A was considerably higher than that of a chronic carrier of this bacillus, who had, in addition, been treated by repeated doses of vaccine.

By all the rules, then, this man should have been a carrier of paratyphoid A, but a prolonged examination of his excreta, continued over many months, was negative.

18.8.10

1.	M.	v.M.	50 cells contain	10 bacilli.
	"	v.H.	50 "	10 "
2.	H.	v.M.	50 "	nil.
	"	v.H.	50 "	25 bacilli.
3.	G.	v.M.	50 "	162 "
	"	v.H.	50 "	nil.

1. Carrier of paratyphoid A. Treated.
2. Carrier of *B. typhosus*. Treated.
3. Suspected carrier of paratyphoid A.

M. = *B. paratyphosus* A, isolated from M.'s faeces.
H. = *B. typhosus*, isolated from H.'s faeces.

The previous history of this man was as follows: He was admitted to hospital in January, 1910, with irregular fever, and he complained of pain in the right hypochondrium. It was thought that he was suffering from hepatitis, but no operation was performed as his fever gradually subsided, and he made a good recovery. He was discharged from hospital in March, and proceeded to the camp at the beginning of April with the other men. On arrival there he was employed up till the time of the outbreak as a cook-orderly, and as such had to do with the preparation and distribution of rations.

Cases 1 and 2 were accommodated in the same tent as this man.

It is interesting to note in many records of the history of carriers, that although the carriers may be constantly infective and continually employed in the handling of foodstuffs, yet they may only occasionally give rise to cases, and in some instances months may elapse without anyone being infected, or perhaps only odd cases arise, although many persons are exposed to the risk.

That the cases which do arise are caused by the carrier is not proved so much by direct positive evidence, but rather by the fact that after removal of the carrier cases cease to occur. It must be remembered that although the carrier is the one absolutely essential link in the chain, he is often innocuous for months until the other links, such as opportunity, susceptibility, dosage, etc., are supplied. But to rely on these other conditions not being forthcoming, or simply to direct attention to minimizing them and to ignore the carrier, is to court disaster.

The carrier in civil life is certainly not the danger to the community that infected persons are in the Army; indeed, carrier infection is peculiarly a military institution. In India, at least, sanitary conditions are primitive compared to the sanitary conditions at home, and it must be remembered that only a few years ago, and in some cases still, the private soldier was not a very cleanly

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person. It is common enough to see on the walls of latrines marks of faecally contaminated fingers; the meaning of this will be better understood when it is realized that there is no issue of latrine paper to soldiers, and, indeed, many of the men come from a class not habituated to its use. Again, there are no facilities for washing of hands in or near the latrines. In one station, where an attempt was made to provide soap and towel for this purpose, these were stolen with the greatest regularity within a few hours of being issued.

Two other instances may be quoted in support of the writer's contention that enteric fever in military service is caused by the carrier; in both instances the bacillus was recovered from the excreta of the man who caused the outbreak.

In August, 1910, several cases of not yet diagnosed fever and pyrexia of uncertain origin appeared in the returns from a particular hospital. The Sanitary Officer, 8th Lucknow Division, visited the station and took blood cultures from two early cases and capsules of blood from some convalescents. The blood cultures were investigated by the writer, and both gave pure cultures of the *B. paratyphosus* A, and the sera of the other cases gave a positive Widal reaction to the same bacillus. There had been no enteric fever in this station for some months, and no immediate cause could be discovered for the outbreak. Several of the men had recently returned from furlough in the hills. On looking up the records of the hospital it was found that one man had been admitted to hospital on July 18, three days after his return from furlough. He had fever for nine days, and was diagnosed pyrexia of uncertain origin. No Widal reaction was done, and he was discharged from hospital on August 5.

The first case of fever was admitted to hospital on August 22.

The blood serum of the man first mentioned was examined in September, and as it gave a positive result he was readmitted to hospital on September 30.

The last case of fever occurred on or about October 12.

Nine cases in all were admitted to hospital between August 22 and October 12.

The suspect, Private K., was sent direct from hospital to the depot at Naini Tal, where his excreta were examined, and the *B. paratyphosus* A was recovered daily from the faeces for about ten days, in October, four months after his attack of fever. He then quite suddenly ceased to pass the bacillus, and although examinations were continued for some months, all were negative. He received no treatment.

Case 1	..	Private M.	..	August	22	..	Widal, positive.
„ 2	..	„	Ch.	..	23	..	„ „
„ 3	..	„	W.	..	24	..	„ „
„ 4	..	„	P.	..	27	..	Blood culture, paratyphoid A.
„ 5	..	„	H.	..	29	..	Widal, positive.
„ 6	..	„	C.	..	30	..	Blood culture, paratyphoid A.
„ 7	..	„	Hs.	..	September 7	..	Widal, positive.
„ 8	..	„	G.	..	26	..	„ „
„ 9	..	„	B.	..	October 13	..	„ „

The measures taken to identify the bacillus isolated from the fæces were as follows :—

(1) Many transparent colonies were found on a Conradi “blue” plate inoculated with an emulsion of the fæces. These when picked off and rubbed up in a drop of high titre serum (paratyphoid A) were at once agglutinated. They were not so agglutinated by typhoid or paratyphoid B serum, although agglutination appeared in a few minutes in the typhoid serum. This is quite common with recently isolated paratyphoid A, and may give rise to error if not carefully checked by the cultural reactions. The writer has seen quite a number of men sent up to the depot as enteric fever, “blood culture, positive,” who were really cases of paratyphoid fever.

(2) A colony is picked off and put on an agar slope and incubated for eighteen hours. The following day a portion of this is again tested by the macroscopic agglutination method. This precaution is always necessary, as there are bacteria which will agglutinate in the specific sera when removed directly from the plate, but do not do so when sub-cultured. On several occasions, however, the writer has isolated bacteria from fæces which were agglutinated by paratyphoid A serum, and this agglutination persisted through many generations although the sugar reactions were not those of true paratyphoid.

(3) With a view to the further identification of the bacillus from the fæces of Private K., it was put up in the sugar tubes and at the same time the stock paratyphoid A was also put up in a series of sugar tubes.

The results were as follows :—

	24 hours	48 hours	One week	10 days
lucose	.. A + G (bubble)	.. A + G (bubble)	.. A + bubble	.. A
Mannite	.. A + G ($\frac{2}{3}$)	.. A + G ($\frac{2}{3}$)	.. A + $\frac{1}{2}$ G	.. A + bubble
Lactose	.. Nil	.. Nil	.. Nil	.. Nil
Cane sugar	.. Nil	.. Nil	.. Nil	.. Nil
Milk	.. Acid	.. Acid	.. Acid	.. Acid
Peptone water Indol, nil	.. —	.. Distinct trace
		Benzaldehyde test		Sulphuric acid test

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Both series were identical and both showed equal amounts of gas in glucose and mannite. This is important, as bacilli have been recovered from fæces which gave the "book" reactions of paratyphoid A or B, as follows :—

Glucose ..	..	..	A + G
Mannite ..	..	..	A + G
Lactose ..	..	..	Nil
Cane sugar ..	..	..	Nil
Milk ..	..	..	Acid
Peptone water ..	..	..	Nil

and yet could be distinguished from true paratyphoid by the amount of gas in the glucose and mannite tubes.

AGGLUTINATION AND ABSORPTION TESTS.

Serum of rabbit which had received a series of inoculations with the stock paratyphoid A.

			DILUTIONS			
			20	40	100	200
Stock A	±	±	±	—
K.'s bacillus	+	+	±	Trace
D.'s bacillus	+	+	+	±

The same serum after absorption with K.'s bacillus :—

			DILUTION		
			10	20	40
Stock A	—	—	—
K.'s bacillus	—	—	—
D.'s bacillus	—	—	—

Serum of a chronic carrier of paratyphoid A :—

			DILUTION			
			10	30	40	100
Stock A	+	±	±	±
K.'s bacillus	+	±	±	Trace

The same serum after absorption with K.'s bacillus :—

			DILUTION	
			10	20
Stock A	—	—

High titre typhoid serum, 1 in 10,000 :—

			DILUTION		
			200	400	8,000
K.'s bacillus ..	..	..	Trace	—	—
Stock A ..	..	..	Trace	—	—
<i>B. typhosus</i> ..	..	..	+	+	+

The same serum after absorption with K.'s bacillus; 1 in 4,000 dilution, immediate agglutination of *B. typhosus*: thus showing that K.'s bacillus was a true paratyphoid bacillus, as in addition to giving similar reactions to the stock paratyphoid A in the same

series of sugar tubes, it was also agglutinated by paratyphoid A serum and removed by absorption the specific agglutinins from this serum. It was only agglutinated in low dilutions by high titre typhoid serum and did not remove the agglutinins (specific) from that serum.

There can be little doubt that the man referred to was the cause of the outbreak in his company. It is difficult to say how the bacillus was conveyed from this man to his comrades, as beyond being "orderly man" in rotation he had nothing to do with the food of the others. But in barrack life there are endless opportunities for contact infection, provided the germ carrier is present; pipes, mugs, clothes, and rifles are all used in common, and the bacillus is introduced into the barrack room on the hands and clothing of the carrier.

In one case the writer traced the conveyance of the germ from one man to another by means of a book which had been loaned by the carrier to his friend, both men being in the habit of turning over a leaf with the aid of a wetted thumb.

The moral of the two cases just cited is, of course, to emphasize the importance of the accurate diagnosis of all fever cases, and this question will be more fully referred to under the heading of prevention.

It may be said, I think without exaggeration, that the whole science and art of the causation and prevention of enteric fever is summed up in the account of these two small epidemics.

The danger of the ambulant case of enteric fever is well illustrated in a recent paper by Major H. W. Grattan and Captain J. L. Wood. Some cases of paratyphoid fever having occurred in a battery of artillery during March, 1911, a preliminary attempt was made to narrow down the issues before examining each man *seriatim*.

Every man was asked if he had recently had fever and the medical history sheets were examined. Seven sickly men were picked out from room A and five from room B. Their blood serum was tested against the *B. paratyphosus* A on March 8, but with negative results. On March 29 the serum of all the men in room A was tested and on this occasion the serum of one man, Br. J., who had already been examined, gave a positive result up to 140.

This man stated that he had felt ill for ten days, but had not reported sick. He was sent to hospital, and thence to the Naini Tal Depôt, where it was found that he was a faecal carrier of the *B. typhosus* A. Such a case as the above is exceedingly difficult to

legislate for, and can only be dealt with by a very close co-operation between the medical officer and the company officer; the latter knows his men and is quick to see if any of them are out of sorts, and if they are aware that he has the confidence of the medical officer will send such men at once to hospital, where in conjunction with the laboratory a rapid diagnosis can be made.

At the present time in the Army it is rare that the chronic carrier gives rise to severe epidemics of enteric fever. His work is rather barrack room and regimental infections, with a condition of endemicity exceedingly difficult to trace to its source. Occasionally, however, a chronic carrier does give rise to small epidemics, and in such cases it may be possible to detect the origin of the mischief.

The members of the Enteric Fever Inquiry (Government of India) report two such instances. During the month of August, 1907, five cases of enteric fever occurred in the detachment of the Bedfordshire Regiment at Kasauli. Two barracks were involved. Each of these was divided into four rooms. The cases arose in different rooms, and there had been no direct personal communication between the patients. The food supply of the two barracks came from a common cook-house, and the latrine and urinal were also in common. As the cases were confined to one detachment, the general water and milk supply could be excluded. Examination was made of the blood, urine, and fæces of all the cooks and contacts of this unit, with the result that one cook belonging to the detachment was found to be excreting large numbers of typhoid bacilli in his fæces. The carrier was at once isolated and no further cases occurred. A definite history of enteric fever could not be obtained, but there was a probability that a severe attack of ague (December 31, 1897, to March 3, 1898), lasting seventy days, may have been an unrecognized typhoid infection. His Widal reaction was negative.

The second outbreak occurred in the Scottish Rifles, at Meerut. During an examination of five hundred healthy men, one man of the Cameronians was found to be a carrier (fæcal) of the *B. typhosus*. He had never suffered from enteric fever, but about six months previously had acted as a nursing orderly over enteric patients. Seven out of ten cases examined at Meerut came from the same unit as this man, and the Cameronians were previous to this a somewhat heavily infected regiment. In whatever station the regiment was quartered the men suffered from enteric fever.

Captain Dorgan, R.A.M.C., describes in the JOURNAL OF THE

ROYAL ARMY MEDICAL CORPS for April, 1910, a very interesting outbreak due to a carrier, but in this case the carrier was a woman and in civil employ. An interesting point in this outbreak was that "boiling" the milk did not destroy the virus, a striking commentary on the efficacy of the "second line" defences. As soon as the carrier was discovered and removed cases ceased to arise.

The previous history of this woman was interesting, as it was definitely shown that she had caused cases of enteric fever in every household where she had been employed.

One other case may be quoted as showing that the importance of the carrier is realized in other armies as well as in our own. During the years 1904-08, the artillery barracks at Wesel had been a veritable "typhoid house." "Its *sanitary conditions were excellent*," and no source of infection could be traced. Typhoid was endemic in the barracks. An examination was made of the excreta of all persons employed in connexion with food, but with negative results. But an examination of the non-commissioned officers resulted in the detection of a chronic urinary carrier—Serjeant B. This man was isolated and cases ceased to occur.

The importance of the carrier is also realized in the American, French, and Japanese armies, in each of which outbreaks and endemic foci have been reported and the causal carrier detected.

Little has been said so far as to the intermediary, or vehicle, as the intent of the writer is to show the prime importance of the infected person, and discussion of the intermediary leads to obscuring the true cause.

At Meerut, in 1907, numerous experiments were carried out by Colonel Sir D. Semple and his coadjutors, in order to discover whether the flies in nature carried infection either on their feet or in their intestines; 1907 was a bad enteric year in Meerut, whereas 1910 was one of the best enteric years in Mhow. The methods employed by us at Meerut, in 1907, were:—

(1) To capture flies from the neighbourhood of or in a latrine used by a detachment which was supplying at the time several cases of enteric fever. These flies were crushed up in saline solution, legs and feet and all, and a drop or two of the resulting emulsion plated out on three large plates of Conradi's medium. Five hundred flies were thus treated, but no bacilli of the typhoid group were recovered.

(2) A block of soil about six square inches in bulk was brought from the trenching ground and placed in the incubator. It was

riddled with maggots ; many of these latter were crushed up and the emulsion plated out. Result, negative.

Also as fresh flies were bred out they were also examined till no more could be got, but all with negative results.

The British Commission on the rôle of the fly in the dissemination of disease investigated this point, and could not recover the *B. typhosus* from flies bred out of infected fæces. They state that the presence in the fæces and in the fly of "bacilli closely resembling the *B. typhosus* is not without significance."

The writer is very well aware of the danger of the fly as an intermediary or mechanical carrier of bacilli from infected fæces to food, but believes that the importance of even this method of infection is exaggerated, and certainly it ought not to occur in any well-regulated cantonment, and with the "wet system" of conservancy now in vogue occurs but rarely. Under certain circumstances, as in a badly looked after camp, provided a carrier is present and is careless in the disposal of his excreta, the flies as a means of mechanical transference of small portions of his excreta to food supplies are a very real danger indeed.

But here, as before contended, the infected person is the primary cause, the fly only secondary.

To say that the flies are themselves infective and a true cause of enteric fever is to put back the clock ten years.

The German investigators in fourteen hundred cases in which the vehicle of infection had been traced allot the proportions as follows :—

Hands, personal contact	..	..	..	1,315 cases
Milk	..	..	..	59 "
Other foods	..	..	..	22 "
Personal linen	..	..	..	2 "
Water	..	..	..	2 "
Total				1,400 cases

Flies as a vehicle of infection are not even mentioned, although possibly a small proportion of the "milk" and "other food" cases may have been due to flies.

(To be continued).

OBSERVATIONS ON SIX HUNDRED AND EIGHTY-FIVE CASES OF POISONING BY NOXIOUS GASES USED BY THE ENEMY.

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WITH A NOTE BY COLONEL SIR WILMOT HERRINGHAM,
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THE following notes are founded on observations of 685 gas cases which came under treatment in No. 8 Casualty Clearing Station between May 2 and May 7, 1915. The patients were brought in by motor ambulance convoys from the Field Ambulances, a journey of about ten miles. Some arrived only six hours after being "gassed," while in other cases a much longer period had elapsed before they were brought in. They were detained in the Casualty Clearing Station only until they were deemed fit to evacuate to the Base. The slighter cases were sent down at the earliest possible moment, the majority were evacuated within forty-eight hours, a number of severe cases were kept for several days while their condition remained critical. The total number of cases admitted during this period was 685. They were suffering from all degrees of asphyxia, but no good reason could be given why some cases were much worse than others from the same trench. It was, however, observed that the older men were almost all severe cases.

Extreme pressure of work made it impossible to make notes on each case, but the following general features have been observed with care, and it is hoped may be of interest and assistance to others.

The whole series could be roughly divided into two groups: (a) Those who seemed in imminent danger of death from asphyxiation—about one hundred and twenty in number; (b) the remainder who, although suffering from the effects of the gas, did not appear in immediate danger.

Of the first group 33 died, giving a death-rate in the total number of cases observed of just under 5 per cent. It must be added here that many other cases died either on the field or at the field ambulances. Of the 33 deaths, 16 died on the day of admission, 13 died on the day following admission, 2 died on the

second day following admission, 1 died on the third day following admission, 1 died on the fourth day after admission. It will be seen that 29 of the 33 deaths took place within thirty-six hours after admission, only 4 dying at a later period.

CONDITION OF CASES ON ADMISSION.

The first intimation that the urgent problem of asphyxia would have to be faced on a large scale was the arrival of the convoy, and it is difficult to convey the mental impression produced when the first batch were unloaded. It was 1.30 a.m. when they reached the Casualty Clearing Station, the gas having been used against them about 7.30 p.m. on the previous evening. One man was dead before he could be removed from the ambulance. Most of the others were in a choking condition, making agonizing efforts to breathe, clutching at their throats, and tearing open their clothes. At one moment they propped themselves up to gasp, at another they fell back exhausted by their struggles. There was marked cyanosis, especially of the lips and ears, and in a few cases a light yellowish frothy discharge was escaping from the mouth and nose. Some, especially the older men, were in a condition of collapse; their faces and hands were of a leaden hue, their heads fallen forward on their chest. The majority of these cases did not rally.

In addition to the asphyxiating effects of the gas, most of the men, although young and robust, were greatly exhausted by continuous fighting against the poison. All, except those moribund or collapsed, were fully conscious and fighting desperately for life. Fourteen men died out of the first batch of seventeen admitted.

Among the hundreds of cases subsequently observed, all degrees of asphyxia were evident, and it is difficult to convey a composite clinical picture of all of these. Certain common features, however, stood out so prominently that our purpose will be served by calling attention to them. Certain of these have been alluded to already.

The typical case was on admission cold, with a sub-normal temperature, conscious but restless, the pulse slow and full (except in the collapsed cases). The face was cyanosed, intensely so in many cases, and the expression was strained and anxious. The posture varied. In some cases the patient sat propped up with head thrown back gasping for breath; in others he lay on his side with his head over the edge of the stretcher in an attempt to aid expectoration. The respirations were jerky and hurried, often numbering forty per minute, and were associated with a choking cough, accompanied by a varying amount of frothy expectoration.

With each inspiration the chest was expanded to its fullest, all the auxiliary muscles being brought into play just as in an asthmatical paroxysm. The percussion note over the chest was somewhat impaired without being actually dull. Auscultation revealed the presence of moist sounds of different qualities all over the chest.

PROGRESS OF THE CASES.

It was noticed that the patients who lived tended to pass through the following more or less definite stages while under our observation.

- (1) The asphyxial stage.
- (2) The quiescent or intermediate stage.
- (3) The bronchitic stage.

Nearly all the cases on admission were in the first or asphyxial stage, which has just been described. This condition demanded immediate and energetic treatment, and was the one which chiefly occupied us at the Casualty Clearing Station. Grave symptoms appeared with startling suddenness, but if patients could be safely brought through this stage, recovery was the rule. The first stage gradually passed off after some thirty-six hours, and the patient fell into a sleep from which he woke feeling much better. He continued in this state for perhaps half a day, and during this period every effort was made to evacuate him safely to the Base.

After these few hours of comparative quiet, symptoms of bronchitis began to manifest themselves. In the majority of cases, as far as our experience went, these were not severe. In the cases, however, which had been kept alive with difficulty, there was a very short quiescent stage, followed by an intense bronchitis. Four of the most severe cases died in this bronchitic stage. Their symptoms as compared with the first stage were as follows: The frothing secretion gave way to thick greenish muco-purulent expectoration, consciousness was replaced by delirium, temperature rose from sub-normal up to 104° F. and the pulse became of small volume while its rate increased to perhaps 160. Respirations were less choking, but more shallow, and numbered up to seventy per minute before death.

TREATMENT.

As *post-mortem* examination showed that the patients died of acute congestion and œdema of the lungs, the aim of our treatment was:—

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- (1) To expel the excessive secretion from the lungs, by emetics and stimulating expectorants.
- (2) To diminish the secretion.
- (3) To support the failing heart and re-oxygenate the blood.

GENERAL TREATMENT.

On arrival of the cases they were placed in the open air, and as they were very cold, extra blankets, hot water bottles and hot drinks were provided.

A little later on, as the weather was unsettled, and to facilitate nursing, the worst cases were placed in a large lofty room with open windows on opposite sides, giving a through draught. Here about 120 out of the 685 cases were treated, the maximum number in the ward at one time being thirty.

I.—SPECIAL TREATMENT.

(1) *Emetics*.—As a routine measure the first eighty cases admitted were treated with emetics. Later on their use was confined to those cases which were obviously choked with secretion, and had not already been sick. The most successful emetic was salt and water, administered in ten-ounce doses, followed by large draughts of lukewarm water; vomiting was *immediately* induced by tickling the back of the throat with a soft brush, or by the patient using his own finger. In all cases marked relief was experienced, the patients bringing up quantities of yellowish frothy fluid. In fact so pronounced was the relief that many tried to make themselves sick again.

Vinum ipecacuanhæ and apomorphine hydrochloride were also tried, but were discarded, neither being so certain in its action as salt and water. There was no difficulty in getting the men to take the latter remedy, even in the most acute cases.

(2) *Artificial Respiration*.—The action of the emetics was furthered in selected cases by the application of Schafer's method of artificial respiration. The results at times were strikingly successful, notably in the case of one man, almost moribund, who was treated in this way on four successive occasions, and who ultimately recovered.

(3) *Stimulating Expectorants*.—Every case was given ammonium carbonate 10 gr. three hourly as a stimulant and expectorant. Later this dose was increased to 15 gr., and vinum ipecacuanhæ 15 minims added. This mixture, although containing a somewhat large dose of ammonium carbonate frequently given, gave very good

results, producing copious expectoration followed by improvement in colour and general relief. In the eighty cases treated with emetics the expectorant followed.

(4) *Posture*.—The action of emetics and expectorants was sometimes aided by altering the position of the patient, from sitting up to lying on the side with the head low down to aid expectoration.

II.—TO DIMINISH SECRETION.

In the hope of being able to check the excessive secretion in the lungs, atropine was administered to several severe cases, in doses of $\frac{1}{60}$ gr. We cannot say we found any beneficial result from this treatment; doubtless its administration was too late, but it might have been of use if given earlier (i.e., in the Field Ambulance).

III.—TO SUPPORT THE FAILING HEART.

Venesection.—In view of the cyanosis and marked dyspnœa, venesection was attempted, ten to fifteen ounces being removed on each occasion. This proved very difficult to carry out satisfactorily as the blood clotted rapidly, and the relief given was very transient. It occurred to us that a more gradual and protracted depletion of the right heart would give better results. Accordingly leeches were procured. Sufficient suitable cases did not then remain, however, to enable an opinion to be formed as to their value.

Pituitary Extract.—Whenever the pulse showed signs of weakening (which was rarely seen except in cases approaching a fatal termination) one cubic centimetre of pituitary extract was given with marked benefit, the pulse becoming fuller and slower.

Oxygen.—As most cases presented marked cyanosis and dyspnœa, oxygen was given freely by inhalation; there was no doubt that temporary benefit resulted, the restlessness decreasing and the colour improving. Continuous inhalations appeared to give no more benefit than intermittent ones. In one or two cases oxygen was given by subcutaneous injection in the pectoral region, the amount given being sufficient to cause a lump in each side of the chest about the size of a small football. This was absorbed very slowly, and no relief was apparent.

In milder cases, when the alveolar and bronchial secretion was not so marked as the irritation of the larynx and trachea, inhalations of steam impregnated with tincture benzoin co. in a closed tent were tried with some relief.

Opium.—There was a type of case in which the mental strain

was a more marked symptom than the pulmonary distress. This type was characterized by extreme restlessness rather than by dyspnoea, and in these cases opii five minims, administered half-hourly until fifteen minims had been given, gave certain relief, the patients quietening down and falling into a peaceful sleep.

Other remedies, such as inhalation of chloroform and amyl nitrite, were tried, but without success.

THE ROUTINE TREATMENT INVOLVED FROM EXPERIENCE
GAINED WAS :—

- (1) Abundant supply of air and warmth.
- (2) An emetic of salt and water if the patient was very cyanosed and had not already vomited, followed by the
- (3) Administration of ammonium carbonate 15 gr. and vinum ipecacuanhæ 15 minims three hourly.
- (4) Oxygen inhalation in cases of marked cyanosis and dyspnoea.
- (5) Opium 5 minims to 15 minims in restless cases to allay the mental strain.
- (6) Pituitary extract (one cubic centimetre) and brandy when the heart threatened to fail.

PATHOLOGICAL CHANGES FOUND IN CASES DYING FROM THE
EFFECTS OF THE GAS.

Post-mortem examinations (ten in all) have been made in cases dying at periods varying from less than a day to five days after inhalation of the gas.

Only relative differences were found, even in cases dying at different periods after the gas attacks, so that the general description is sufficient.

The most important changes were found in the lungs, but some changes of note were present in the heart and stomach.

Respiratory System.—In the larynx, there was in several of the acute cases a distinct but not marked œdema glottitis. The internal surface of the larynx was congested, even the epiglottis being involved, but not nearly to the same extent as the trachea.

The mucosa of the trachea showed in nearly all the cases intense congestion and œdema, and this could be traced down into the larger bronchi. In almost every case post-mortem the trachea and bronchi were filled with a thin light-yellow frothy secretion, which was found escaping from the nose and mouth of the cases when they were laid on the post-mortem table. This

secretion was highly albuminous and solidified like white of egg whenever it was heated. The large bronchi only could be traced, the smaller being lost in a condition of intense congestion and œdema which affected the lungs as a whole. The lungs in situ were in most cases voluminous, and bulged forward so as to partly cover up the area of pericardium normally left bare. The most notable characteristic of the lungs when removed was their increased weight, which was several times greater than the normal. The pleural surfaces of the lungs could be mapped out into patches of lighter grey and dark, greyish brown, and the pathology of their appearance will be returned to in a moment. There were sub-pleural hæmorrhages in all but one case. These hæmorrhages were small in size, but in some cases extremely numerous. The lung tissue when incised was found to be of deep maroon red colour, and fluid secretion flowed in great abundance from the cut surfaces. The structures of the lung could scarcely be made out on the cut surface, the small bronchi being hidden amid the intense congestion. In one case considerable hæmorrhage had occurred into one lobe, giving rise to an area about the size of an orange, resembling microscopically a large hæmorrhage infarction. A slice of lung cut from this area sank in water.

To return now to the light grey patches on the surface of the lungs. These were most numerous along the margins of the lungs and on the diaphragmatic surfaces, but were present up to the very apices. They were found to be areas of actual acute emphysema, and air could readily be made to pass from one side of such an area to the other. In one case, bullæ of about the size of a small marble were present along the interior margins of the lungs. The emphysematous process did not extend in any area for more than a depth of half an inch into the tissue of the lung from the pleural surface. The margins of these patches were clearly but not quite sharply demarcated from the lung tissue beyond, as the congestion was not at all marked in these emphysematous areas. In several instances the lymphatic channels below the pleural surface of the lungs stood out as prominent lines filled with opaque fluid, there being, evidently, considerable obstruction to the lymphatic flow.

The Heart was in all cases seen to be distended even before the pericardial sac was opened. The dilatation affected all four chambers of the heart, but especially the right auricle and right ventricle. On opening the heart all the cavities were found filled with recent clot, no ante-mortem thrombus being found.

Abdomen.—None of the organs showed more than a condition

of venous congestion, except the stomach. The liver in the case of one man, who died five days after inhalation of the gas, appeared fatty, but this observation has not, so far, been controlled by microscopic examination.

The Stomach when opened was, in all cases, found to be in a condition of marked catarrh. The muccsa was covered with a thick yellowish mucus, and submucous hæmorrhages were present in nine cases out of ten examined. In one case the amount of submucous hæmorrhage present was extreme, and covered almost half of the inner surface of the organ.

The Head was examined in the majority of the cases, but nothing beyond marked congestion of all the vessels, both of meninges and in the cerebral tissue, could be found.

Histology is pursued here under great difficulties, in consequence of which microscopic sections have only been prepared so far from the lungs. The specimens are interesting, however, as they bear out all macroscopic observations with regard to the areas of emphysema. The chief microscopic appearances were briefly these. The parts of lung tissue not affected by the emphysema showed marked congestion of the capillaries and many alveoli, but not by any means all were seen to be filled with an albuminous amorphous substance, taking up the eosin stain. In this substance fibrin could be here and there detected, along with red corpuscles and a few leucocytes. A few alveoli were observed filled with preserved red-blood corpuscles.

In the portions of lung affected by emphysema the microscopic changes were very different. Many of the alveoli were broken down, so that, perhaps, a group of five or six had run into one. The broken free ends of the alveolar walls appeared in the sections more or less bulbar shaped, with a darkly stained cap of amorphous appearance on the top. The alveoli not broken down were obviously much distended, being almost twice the size of the normal lung alveoli under the same magnification. This condition of distension had quite obliterated any tendency to congestion of the alveolar capillaries, the walls of the alveoli being found thin, and practically free from blood corpuscles.

These facts account for the light grey colour of the emphysematous patches, as compared with the rest of the lungs. The bronchi in the areas of emphysema were empty of contents, in contrast to the congested and œdematous lung tissue in other parts where the alveoli were found filled with the amorphous eosin-staining material already referred to.

SUMMARY.

From the foregoing account it seems desirable to emphasize certain points again. None of the cases remained in the Casualty Clearing Station for more than five days after the inhalation of the gas. It is, thus, the acute stages only which are described in this paper.

On admission, the cases were of two chief classes:—

- (1) The acute asphyxial.
- (2) The subacute.

Of the first class almost one quarter died. This class was characterized by orthopnoea and marked cyanosis. The subacute cases, on the other hand, showed dyspnoea never amounting to orthopnoea, and were cyanosed to a lesser degree.

It must be added that treatment of the acute asphyxial cases was unsatisfactory, which is not to be wondered at when considered along with the changes found in the lungs post mortem.

The subacute type, however, responded well to treatment, and the cases, although distressed by constant coughing, all admitted the relief gained. The treatment found most satisfactory of all, in such cases, was the frequent administration of ammonium carbonate in full doses.

Now that respirators of an efficient type have been issued to the troops, it is hoped that many cases requiring to be dealt with will conform to the subacute type when treatment is of avail.

NOTE BY COLONEL SIR WILMOT HERRINGHAM,

Consultant Physician, G.H.Q.

I saw a large number of these cases myself and can confirm the report in every particular. Subsequent experience has shown that the milder cases, which are the large majority, recover fairly well. A medical officer of one battalion, who stayed with the battalion in the trenches through a fairly severe "gassing," is now back again in good health after about a month's convalescence.

The problem is how to prevent the severe cases. I have not the least doubt that proper respirators properly used will almost entirely stop their occurrence. This was proved in the last attack. One battalion with a fairly good pattern of respirator, well used under the intelligent direction of its officers, stayed in its trenches and suffered hardly at all.

Accidental cases will now and then occur, however. In experiments on animals, atropine given in the earliest stages undoubtedly

prevents œdema. I have, however, been surprised to find that **no** Field Ambulance reports very favourably upon it. In fact, of the five or six Field Ambulances who have treated these cases **and** have told me their experience, **no** two recommend the same drug or the same method. This difference of opinion shows at least **that** no other drug appears to be of great value. I hope that if **more** gas attacks occur we shall be able to try the effect of atropine at **an** even earlier stage than the Field Ambulance, and to try it rather more systematically. When the œdema has once set in there **is** nothing to be done but to aid the patient to expel the fluid, **and** maintain his strength. The opinion at the Casualty Clearing Stations is almost unanimous in favour of ammonium carbonate.

Only a few cases have remained in the Stations, and therefore under my observation, to the stage of bronchitis and bronchopneumonia. These patients, who are dangerously ill, seem to **do** better with soothing than with stimulant remedies.

The later stages will however, I hope, be described by medical officers of the Base Hospitals who have seen far more of them than **I** have.

A SUGGESTED FORM OF ORGANIZATION OF CON- VALESCENT CAMPS.

BY CAPTAIN GORDON WARD.
Royal Army Medical Corps (S.R.).

THE following remarks are made after experience gained at the first camp for convalescent soldiers set up in this country, viz., that at Eastbourne. They are more particularly applicable to a camp of not less than three thousand beds.

Definition of "Convalescent."—Speaking of convalescent depots the "Royal Army Medical Corps Training Manual, 1911," paragraph 286, page 133, says as follows:—

"Their function. . . . is to relieve pressure on the hospitals so that adequate accommodation may be at all times available for serious cases coming from the Front. They receive officers and men who require no further active medical or surgical treatment, and who, although not yet fit for duty, are likely to become so in a reasonable time; when necessary, re-clothing and re-equipping them before they return to their units."

This paragraph, although not intended to cover such extensive developments as are now necessary, is still in the main applicable. But although the ideal case is still one which requires no active treatment it is obvious that pressure on the hospitals would seldom be properly relieved if no other class of case was admitted. It is therefore necessary to prepare for—as a general rule—cases requiring active treatment in the form of massage and cases which may need to stay for at least six weeks and—exceptionally—for medical and surgical cases which cannot properly be treated except in bed, and then only with the aid of proper hospital equipment. "Convalescent" must therefore be held to include these three classes of case which do not fall within the definition above.

Classification of Patients.—A camp for three thousand patients will have, say, one hundred and twenty huts as well as central offices; the following units will have to be found, viz.:—

- (1) Headquarters—orderly room, staff quarters, pay office, etc.
- (2) Institute and office of officer in charge of entertainments.
- (3) Hospital lines.
- (4) Reception division.
- (5) Division for neurasthenia and shock cases ("N.S." cases).
- (6) Division for general cases.
- (7) Departure division.

Procedure.—Before discussing these divisions in more detail it will be well to outline the procedure from the time of admission of a patient until his discharge fully equipped to duty overseas.

The soldier is admitted in khaki, which is usually more or less unserviceable, and may arrive at any time of the day. He is sent at once to the reception division, which has been warned of the number of cases to be expected and has ready food, etc. This division renders a numerical return of admissions according to hospital of origin to the central orderly room. At the reception division the soldier's name is taken and entered on index cards in triplicate. These cards are disposed of as follows :—

One goes at once to the central office and is primarily for the use of the pay officer.

One remains with the reception division as a record of admissions and for making duplicates should the third be lost.

One goes with the soldier (but not in his charge) until he is discharged, when it is returned to the central office as a complete record of everything pertaining to the soldier.

These cards will be further dealt with below. The soldier is subsisted in the reception division for the day of arrival and the next day. He sleeps the first night in this division. In the morning he is given a complete set of hospital clothing (including gown). This may if more convenient be given out over night or placed on the bed before the soldier's arrival, or in the morning; he then gives in his khaki to the pack store and also draws a razor, knife and fork, etc., if these are available for those who need them. He is then seen by the medical officer (he has of course been seen by the orderly medical officer of the day on arrival in case immediate treatment is needed). The medical officer has the cards before him and marks them N.S., G., H., or exceptionally D., according to the fitness of the soldier for the Neurasthenic and Shock division, the General division, for Hospital, or even if, as will sometimes occur, he is practically fit for the Departure division. These divisions are then warned of the numbers and put in a supplementary indent for the numbers of rations required for the next day. The patient goes to his new division after tea on his second day in the camp. His card goes with him. We will suppose that he is sent to hospital. He is treated and subsisted there until such time as he is fit to attend as an "out-patient" for dressing or for discharge as no longer needing hospital treatment. He is then transferred to the N.S., G., or D. divisions. If allotted to the G. division he remains there as long as the medical officer in charge thinks needful; he may

if necessary be sent back to the hospital lines by this division (there will always be a certain number of admissions to hospital due to tonsillitis, influenza, etc.), but he will eventually be transferred to the Departure division. This division will draw his clothes from the pack store, discard those which are no longer serviceable and equip him for duty. In the case of the seriously wounded it is permissible to give a few (not more than seven) days' leave. At the end of this leave he returns to the camp until included in a draft. During this time he is available for general duties and fatigues in the camp, and also enjoys the privileges in the matter of passes to which a soldier is entitled.

Headquarters Division.—The officers of this division will be the commandant and his adjutant. If the latter has not time to perform the duties of pay officer another will be required for the purpose. Neither need be a medical officer. It may be borne in mind that the visits of civilians, especially of ladies disposed to contribute to the soldiers' entertainment, etc., will occupy a considerable amount of time. Visits of inspecting officers may also be relatively frequent.

The pay officer receives one of the three index cards for each patient. These are filed in alphabetical order by regiments. A soldier in hospital does not ordinarily receive pay, but it is permitted to make advances of, e.g., three shillings per week per man as pocket money. This is given on acquittance rolls, and involves a considerable amount of labour. He would also have charge of the pay of the Staff. The duties are not highly technical and could well be performed by a combatant officer unfit for further foreign service.

Institute and Officer in Charge of Entertainments.—Here, again, the duties are such as can well be performed by an officer not possessing any medical qualification. Some of the matters which would fall within his province are as follows: The canteen, the billiard rooms, arrangements for entertainments in or out of the camp by theatrical or concert parties, gardens, open-air tea-rooms for patients' friends and visitors to the camp, games and matches, competitions of all sorts, etc. It is necessary if the camp is to fulfil its purpose to enlist the sympathy of residents in the neighbourhood, and their help is only given in return for an amount of attention which often exceeds that which one has really time or means to give. The above list of activities, which may seem unreasonable to some, is not a matter of theory but of practice, at least at Eastbourne.

Hospital Lines.—These must be fully equipped with all possible hospital facilities. They are in two parts—an out-patient and an in-patient department. The hospital is for all practical purposes non-dieted, but extra articles of diet may be obtained from the divisions, which will generally have a surplus from the fivepence halfpenny allowed, from which they will be willing to provide extras for such of their men as are in hospital.

In the same block as the hospital lines will probably be situated the massage department and the dental surgery. These will be managed as out-patient departments, to which patients may be sent at a stated hour from any of the divisions of the camp. They are then examined and receive instructions as to when to return for daily treatment. On the conclusion of such treatment a note is sent to their divisional officers—this can be in the form of a circular letter sent out once weekly, from which each divisional officer will extract and enter on the index cards such information as seems appropriate. Patients going to any out-patient department will be provided with a card showing their name and division and the nature of the disease for which hospital, dental or massage treatment is required. On this card the officer in charge of the out-patient department will enter for the soldier's guidance the times at which he is to come for treatment.

Reception Division.—The original practice at Eastbourne was to send all patients directly on admission to one or other division, there being five divisions, each taking certain regiments, but the patients not being otherwise classified. The disadvantages of this system were very soon manifest and were mainly as follows: As only a numerical roll of incoming patients was rendered by the hospitals from which they came it was impossible to say prior to their arrival how many (on the regimental basis) would be allotted to any one division; in consequence the rationing could not be arranged and it was necessary to appoint one division each month as a receiving division for the purpose of rationing. This division would not have sufficient beds for sleep, as well as subsist the newcomers, and hence one had the anomaly of a man sleeping in one division and being rationed in another. The man as a matter of fact usually went to the dining hall of the division in which he slept, which led to a shortage of rations there.

Each division contained patients of all varieties, i.e., medical, surgical, and hospital cases, which made it difficult to give the proper medical attention. In addition each division had its own pack store, etc., and paid its own patients and carried out the

clerical work in connexion with them. This tended to prevent adequate attention to both the medical and administrative work, and also involved employing a medical man on purely administrative duties—a procedure which is inevitable up to a certain point, but which under the scheme now outlined is avoided as far as may be. There was no means of choosing the right men for camp fatigues, for motor rides, or for entertainments, with the result that the most healthy were often able to escape fatigues and to obtain rides, etc., to which they were less entitled than others. For example, the more joyous type of cinema entertainment is well suited, one may suggest, to the mildly neurasthenic case, but these, unless picked out for the purpose, were apt to be forestalled by the more healthy in mind. But from the fact that such cases tend to remain in or near their huts they were usually more likely to be called on for chance fatigues for which those who were stronger were really suited.

The regimental system of division broke down as soon as one division was temporarily full; patients had then to be drafted to another division, and their return when the first division had accommodation for them could only be carried out with considerable clerical labour.

The reception division—in which the duties are purely clerical—avoids these difficulties. Generally speaking, neither fatigue nor entertainment parties would be chosen from this division. Moreover, the dieting arrangements would be made not only with a knowledge of how many patients were to arrive on any given day, but also with knowledge of what time they were to be expected. At Eastbourne it was by no means uncommon for patients to arrive at nine or ten o'clock at night—sometimes not having had a meal since breakfast. Such unfortunate circumstances cannot always be avoided when a large draft of wounded is notified as arriving from overseas.

The Division for "N.S." Cases.—There is little to say about this division except that it is not a very large one, but is one that requires the most careful and sympathetic medical attendance. A certain number of the patients here will probably become fit for home service but not for general service—indeed, the idea of return to general service is frequently a considerable bar to recovery, especially in the border line cases in which melancholia is a symptom. This division is not intended for malingerers of the more obvious sort such as many cases of "rheumatism." Experience of institutional work in connexion with nervous and mental

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diseases, combined with a working acquaintance with the ways and wiles of T. Atkins, would be a most valuable qualification in the medical officer in charge of this division.

General Cases Division.—This will be the largest division in the camp, the next in size being, in all probability, the departure division. It will require a room from which ordinary medicines and tonics can be given to patients, but otherwise will not be actually concerned with active treatment. The chief duty of the medical officer in charge will be the daily inspection of a portion of his patients, those fit for departure or requiring special treatment being dealt with accordingly.

Departure Division.—This will deal chiefly with equipment, leave and discharge—all of which duties can be carried out by a combatant officer. The men will be clothed in khaki and will no longer be regarded as convalescents but as serving soldiers. The N.C.O.'s in particular might often be usefully employed in conducting parties of patients, or about the camp. They would not, as a rule, be entitled to attend entertainments until the "blue" patients (i.e., those in hospital clothing) had been provided for.

The "Card and Clip" System.—This is not a new thing, but is by no means in general use. The cards have already been mentioned—they will provide spaces for the following particulars :—

(1) Regt. No., rank, name, unit, age, religion, service. These, together with a blank space for the letter of the division, will be along the top edge of the card. They will thus be at once obvious in the index register.

(2) A large space for the nature of the injury, etc.

(3) A smaller space beneath this and on the left-hand side of the card for treatment, in which will be entered "M" for massage, "Med." for medical, "D" for dressing, etc.

(4) On the right-hand side of the card, one below the other, spaces for date of admission, hospital of origin, whether inoculated, date of furlough, date of discharge, place to which discharged.

(5) Other details will be entered on the back of the card, e.g., sickness originating while in camp, details of the course of the disease, or other matters of interest.

The use of the cards is as follows : When the officer in charge of a division is seeing patients who will be paraded for the purpose he will have the cards with him in alphabetical order in a suitable box. If he wishes to transfer a patient he will cross out the divisional letter and enter that of the new division. In the same

way, if he thinks a patient must be discharged the service, or is fit only for home service, etc., he will make an entry of "B. 179" or "H.S." across the card (or a special place may be provided for such entries.)

He will not replace the cards but will give them into the hands of a clerk, who will enter the names on the appropriate list—these lists being kept on ordinary foolscap sheets (in duplicate). They hang on the wall over the clerk's table in bull-dog clips of the ordinary pattern. When returns of any particular class of case are required by the central office (e.g., of cases which will require medical boards) a list is immediately available with the salient medical details already entered thereon, e.g., "V.D.H." or "Total paralysis arm," etc.

This is in practice far simpler than using books for the purpose of keeping these lists—the lists can be produced in blank on the duplicator in any numbers, the headings being as follows:—

Class of Case:					
No.	Regt. No.	Rank	Name	Unit	Remarks

These are merely the outlines of a method of organization of a camp of, say, three thousand convalescent soldiers—they are convenient for other reasons than those quoted. One may give a chance example. Suppose that Private Smith is guilty of some minor breach of discipline. As a patient in hospital the means of discipline available are somewhat limited. It would probably be necessary to inform him that there would be no advance of pay available for him for the current week. In this case a note would be sent to the pay officer, and on the next pay day of Private Smith's unit he would find, if he had the hardihood to apply in the hope that the matter had been overlooked, as he probably would, that the pay officer had removed his card from the index register for one week. In consequence his name would not be on the acquittance rolls and would not be called.

Again, on any matter arising after the patient's discharge, it would not be necessary to search admission and discharge books—his name would be found with all details of his stay in the camp in the index register of discharges which would be kept at the central office.

LEAVES FROM A NOTE-BOOK.

BY COLONEL R. H. FIRTH.

THE following pages are based upon entries in old note-books, and are sequential to some previous articles to this Journal under a similar title. The range of subjects is limited, as the topics are mainly physical; but, as they refer to questions not falling within the literature available to most readers, it is probable that they may be all the more interesting. No claim for originality of thought or work is made; all that one has done is to put in readable form certain notes and scraps of knowledge, picked up in the course of desultory reading.

I.

Every reader is familiar with the fact that the ultra-violet rays of light play an important part in giving us headache or sunstroke, in producing a photograph, in sterilizing water, and apparently in bringing about mutations in bacteria; but how many realize that these same light rays are potent in producing a change in the state of electrification of a body? These changes are commonly spoken of as actino-electricity or photo-electricity. Hertz was the first to make observations in connexion with this subject. He noticed that when the ultra-violet light fell upon a spark gap, the electric discharge took place more easily than when the gap was not so illuminated. The source of the light was immaterial, but the greater the actinic quality of the source of light employed, the more powerful the effect. Soon after, Ebert showed that the action had its seat at the kathode or negative terminal of the spark gap, and Hallwachs discovered that a body carrying a charge of negative electricity loses that charge when ultra-violet light falls upon it; on the other hand, if the body is charged positively it is not discharged under the influence of light. Further, a body free from an electric charge at the outset acquires a positive charge of electricity when exposed to ultra-violet light. The significance of these observations will be manifest, as they emphasized the difference between negative and positive electrification and, moreover, led directly to the development of the electron theory. All these experiments were carried out by causing the rays to impinge upon brightly polished metal plates.

In accordance with modern electrical theory, light is regarded as an electro-magnetic disturbance, and a change in electrification

as due to the removal or addition of negative electrons. At ordinary pressure in a gas, the electrons liberated at the illuminated plate form ions by becoming attached to one or more gaseous molecules, and these carriers move slowly through the gas under the influence of the electric field. If the strength of the field is greatly increased, ionization by collision takes place, at first due to the motion of the negative electrons, but in later stages due to the motion of both positive and negative ions, until at length the discharge passes in the form of a spark.

One has explained that the characteristic feature of actino-electric action is the loss of a negative charge or the acquisition of a positive one, under the influence of the light. This is traced to the emission of negative electrons from the illuminated surface. It is of interest to know how various substances compare in regard to such emission, and whether any relations can be traced between the photo-electric activity and the other properties of the substances. The main difficulty met with in attempting to classify the metals in the order of their photo-electric power is due to the variations in the activity under different experimental conditions. The method of preparing the metal surface gives rise to differences that are often very large. The most satisfactory method and one which gives a perfectly pure metal surface and free from surface films is that in which the material is obtained by distillation in a very high vacuum.

Attempts to classify the metals have been made by various experimenters. From tests in air at atmospheric pressure, Ramsay and Spencer place them in the following order: Al, Mg, Zn, Sn, Cd, Pb, Bi, Au, Ni, Co, Cu, Ag and Fe. This list is roughly parallel to that of the Volta contact series. Tests made in high vacua give an order of the metals as follows: Cu, Au, Ni, Brass, Ag, Fe, Al, Mg, Sb, Zn and Pb. The experiments on compounds of the metals have been carried out chiefly at atmospheric pressure; the results are greatly influenced by the condition of the surface and the character of the light employed. Generally speaking, the metallic compounds containing sulphur or the halogens show the greatest actino-electric activity, and it is noticeable that these compounds are those which frequently show marked phosphorescent effects. It has been suggested that the halogen salts themselves are not photo-electric with wave lengths longer than 184.9 micro-millimetres, but that the light first of all decomposes the compound and then acts on the metal.

Of the non-metallic compounds, water shows no photo-electric

current illuminated by light from a mercury vapour arc; a sheet of water is quite transparent to much of the effective radiation. Certain impurities, however, tend to confer photo-electric activity upon water; the most marked effects have been obtained when water contained potassium nitrate, formic acid, or any of the aniline dyes. The facts seem to be associated with the formation of solid surface films, but the formation of a surface film does not always proceed parallel with the photo-electric effect. Inorganic colloids, like arsenic and antimony trisulphides, exhibit similar behaviour and the phenomenon is probably in all these cases not an oxidation process, but intimately associated with surface disintegration. The chemical relations of photo-electric activity are still somewhat obscure, but we should expect photo-electric substances to be oxidizable, as they lose readily negative corpuscles and so get positively charged, and in a fit state to combine with an electric negative substance like oxygen; there is, however, no evidence that the presence of oxygen is necessary for the photo-electric effect. Another point worth noting is the fact that actino-electric activity is not an atomic property as is radioactivity. In compounds of the elements, the activity is found to be a constitutive and not an additive property; thus, the sulphides of lead, antimony, arsenic, manganese, silver, and tin are photo-electric, while the sulphates are not. Again, hydroquinone gives a marked effect, yet its isomer resorcin is almost inactive; so again, dry ice is photo-electric while water in the liquid state is not.

The question whether gases show any photo-electric activity is of great importance. Since we have to deal with isolated molecules in a gas instead of with matter in bulk, we might expect from this source to gain information as to the mode of liberation of electrons from the molecule. The results are disappointing owing to experimental difficulties. The main facts deducible are that, when irradiated by ultra-violet light, the gas molecules lose negative electrons and the liberated electron attaches itself to another molecule, forming a negative ion, while the molecule from which it escaped acts as a positive ion; thus the gas is ionized. The ionization of gases by ultra-violet light raises interesting questions in connexion with meteorological phenomena and the propagation of electro-magnetic waves round the earth. In the outer regions of our atmosphere there will be direct ionization of the gases through the action of the extreme ultra-violet rays, and in the lower strata there will be indirect ionization due to the presence of dust particles and condensation nuclei which evince photo-

electric activity for the longer wave-lengths. These complicated effects produced in the atmosphere by sunlight and kathode radiation from the sun are of obvious interest. The differences in the transmissibility of artificial electro-magnetic waves in wireless telegraphy during day and night and certain diurnal variations depend on changes in the state of ionization of the atmosphere. At sea level the air is only slightly ionized, while at the height of a few miles it is known by balloon observations that the ionization is as much as twenty times that at the surface. It is supposed that during the day the electric waves travel in a comparatively thin shell between the middle atmosphere and the surface of the earth, while at night they travel in the much wider shell below the high conducting layer believed to exist at great heights. It is well-known that wireless signals are more readily transmitted by night. Electric radiation starting from a point on the earth's surface is supposed to undergo refraction downwards when it reaches the highly ionized stratum of the upper atmosphere.

II.

In the preceding note a general review has been given of the nature of actino or photo-electricity; in this an attempt is made to explain theories of photo-electric action. Assuming that the essential feature of such action is the liberation of electrons by light, it is necessary to have some ideas as to what classes of electrons are set free under the influence of light, and how those electrons obtain the energy for their emission from the various surfaces. Though a complete and final answer to these questions is not yet available, it is feasible to outline the theories suggested for their solution.

The electrons associated with matter may be classified into four groups. They are, the so-called free electrons, the dispersional or emission electrons, the valency electrons, and the photo-electric electrons. To the "free" electrons the electrical conductivity of a metal is due; these electrons can either wander freely between the atoms with velocities in agreement with the laws of the kinetic theory of gases, or they are handed on from atom to atom, in such a way that in the presence of an electric field a continuous transference of electrons takes place through the material. The "emission" electrons are those which give rise to the absorption of light by a substance, and, at higher temperatures, give out radiation; these electrons are concerned in the phenomena of the

Zeeman effect. The "valency" electrons correspond to the chemical valencies and, by their passage to another atom, cause the elec-positive valency of the atom they have left; it is conceived that the maximum number of these valency electrons in the atom is eight. The "photo-electrons" are those which are separated from the atom under the influence of light. It is probable that some of these groups are identical, especially the emission and valency electrons. On the other hand, J. J. Thomson suggests that when an atom is giving out its spectrum it is surrounded by a swarm of electrons. The characteristic spectrum lines may then be due to the vibrations of systems of electrons, which are not permanent, but yet lasting sufficiently long to emit a large number of vibrations. In this sense, the lines of a spectrum are due to the vibrations, not of electrons inside the atom, but of those in the field of force outside the atom. What and which the so-called photo-electrons are, it is difficult to say. The weight of opinion regards them as identical with the free and valency groups; in any case, they are derived probably from the number more or less closely bound up with the atom.

As to the way in which electrons can acquire sufficient energy to escape from a metal surface under the influence of light, there are three possible theories. The first is that the electron is expelled by a process like to an explosion, resulting from instability of the atomic system, induced by the light. As actino-electric activity is not an atomic property, there are grave objections to this hypothesis. According to the second theory, the electron is liberated in consequence of the velocity imparted to it by the passage of a half-wave of light; this means that the kinetic energy of the emitted electron is derived directly from the energy of the incident light. Against this view is the fact that the velocity of emission of photo-electrons does not depend on or agree with the intensity of the light. The third view attributes the expulsion of electrons to resonance. The electrons being set in resonant vibration by the incident light, and acquiring sufficient velocity to enable them to escape from the atom. Under this theory, we can imagine an electron executing linear vibrations about a position of equilibrium and suppose that when the amplitude of the vibration exceeds a certain and definite limit, the electron passes beyond the range of the attractive force, binding it to the atom. If light of the same period is incident upon it, so as to excite linear resonant vibrations, the amplitude of the vibrations will go on increasing. When the amplitude reaches the assigned limit, the electron would

be free from the atom, but its velocity would be nil. To enable it to leave the atom with a definite velocity it must acquire an over-plus of kinetic energy, and this excess must have been acquired during the last half of the whole resonant vibration. In this manner we conceive the initial velocity with which the electron escapes from the atom to be derived directly from the light and from one half vibration. Under the circumstances, the initial velocity ought to increase with the intensity of the light; this is not the case, as experiments show the velocity of the emitted electrons to be independent of the light intensity, though the number of electrons emitted per unit time is directly proportional to the intensity of the light. In spite of this discrepancy, the balance of probabilities and opinion is in favour of regarding the emission of electrons from metals and photo-electric effects generally, under the influence of ultra-violet rays, as a resonance phenomenon.

III.

The preceding notes show that problems of very great interest are associated with the emission of electrons from atoms of matter subject to the influence of a light wave. Though recent investigations have thrown some light on these problems, many points remain to be elucidated; among these are the real nature of light, the lengths of electric and heat waves, and the newer ideas as to radiation. It has been explained that the majority of physicists prefer to explain the absorption of energy, from incident light which photo-electric activity implies, on a theory of resonance, or that the energy of the orbital motion of the electron is gradually released by sympathetic light vibrations till the electron is able to escape from the control of the forces binding it to the atom. This, of course, means an adherence to the undulant theory of light, but it is interesting to know that J. J. Thomson has put forward a theory as to the nature of light which helps to meet some of the difficulties of actino-electric activity. He supposes that the ether through which the light is travelling has disseminated through it discrete lines of electric force. The energy travelling out with the wave is not spread uniformly over the wave front, but is concentrated over those parts of the front where the pulses are travelling along the lines of force. Thus, the front of a Röntgen pulse or a wave of light would suggest the appearance of a number of bright spots on a dark ground. From this point of view the distribution

of energy is very like that which was contemplated on an old theory that the energy was located on moving particles disseminated sparsely through space. The energy is, as it were, done up into bundles, and the energy in any particular bundle does not alter as the bundle travels along the line of force. On this view of the nature of light it is possible to explain the proportionality between the number of electrons emitted and the intensity of light, as well as the dependence of the velocity of emission on that intensity. Thus, if we consider light falling on a metal plate, if we increase the distance of the source of light we shall diminish the number of these different bundles or units falling on a given area, but we shall not lessen the energy in the individual units. Any effect which can be produced by a unit by itself will, when the source of light is removed to a greater distance, take place less frequently, but when it does take place it will be of the same character as when the intensity of the light was stronger. This "unitary" theory of light gets over many of the facts of photo-electric action, but owing to its unreconcilability with the fundamental electro-dynamic equations of Maxwell and Hertz, cannot be accepted without considerable reserve.

The mention of these names brings us at once to the question of electric and heat waves. In the seventies of the last century, Maxwell enunciated his theory that light and heat consist of electro-magnetic waves, involving the correlation of the electrical and optical properties of bodies. His work dealt with waves of very or comparatively short lengths; then came the discovery by Hertz of waves, produced by direct electrical means, having a wave-length of some sixty centimetres. This meant a far cry from waves evident to the eye, that is, less than a micro-millimetre in length, to waves of many centimetres in length; from frequencies of billions per second to those of millions per second, and from those downwards to the limiting case of steady electric fields, under which electric conductivities and dielectric constants are measured. Recent research has done much to fill the gaps and solve outstanding problems of the Maxwellian theory. The accompanying diagram gives a rough idea of the spectrum as known at present, and shows the range of etheric waves to be from one-tenth of a micro-millimetre to infinity, with an unbridged gap of nearly four octaves extending from about one-third to four millimetres. The interesting point about the newer work in this physical field is that short electric waves, down to a limit of four millimetres, have been investigated, and, by the use of these short

waves, the verification of the analogy of the behaviour of these rays and visible rays carried into the greatest detail; the present day situation amounts to this, that the whole range of wave lengths, from infinity down to fractions of a micro-millimetre, has been annexed to the domain of ether waves.

The facts concerning ether waves have opened up several avenues of progress, not the least interesting being the foundation of a new conception regarding the thermodynamics of radiation, and the formulation of some very suggestive astronomical applications, to say nothing of some considerations on the interaction of matter and ether which challenge the accuracy of the fundamental axioms of Newtonian mechanics.

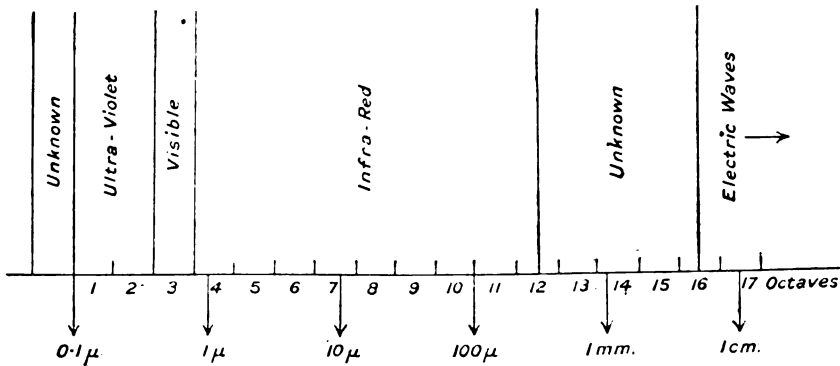


FIG. 1.

On Maxwell's electro-magnetic theory, waves of light, heat and electricity are all of the same type; in the plane of their wave-fronts are tubes of electric and magnetic force, such tubes behaving as though in a state of longitudinal tension and, at the same time, exerting a lateral repulsion on adjacent tubes of the same sign. The waves combine to form a resultant pressure which is equal to the energy density in the medium. In the case of light, when incident on a reflecting surface, the force exerted is expressible in terms of the induced electric currents in the surface; a perfect reflector is a perfect conductor. The alternations of magnetic force cause induced currents confined to the surface layer of the conductor, these currents being perpendicular to the tubes of magnetic force in the incident wave front. The usual laws of mechanical force in a conductor, carrying a current in a magnetic field, apply, and the conducting surface is repelled. The existence

of a pressure is an obvious consequence of an electronic emission method of energy propagation. Recent experiments by Poynting, Lebedew, Nichols and Hull, into details of which it is impossible to enter here, have established very clearly the existence of a radiation pressure; the results justify the generalization that in wave motion of every description there is a pressure normal to the wave-front equal in value to the energy density.

If we think of ordinary sunlight, we conceive a pressure from it constituting a repulsive force; that force, however, is insignificant except in the case of small bodies. This effect has been considered in respect of the fine dust in the tails of comets, and also as to the larger particles which constitute meteorites. By its cumulative effect, the repulsive action of sunlight may modify seriously the motion of such bodies. If we imagine a swarm of meteorites of various sizes moving in a circular orbit round the sun, the gravitational acceleration will be affected by the light-push and the velocity of their movement reduced, accompanied by an increase in their revolution period. As this effect takes place to an extent increasing as the body becomes smaller, a sorting action results, the smaller particles lagging behind the larger, so that ultimately a ring will be formed. It has been suggested that the rings of Saturn may have been thus evolved. If the orbit be an elliptical one, there will be a steady tendency towards a circular one, motion to the focus will be resisted, also motion away, so that the body tends to move everywhere perpendicular to the line joining the body to the sun, in other words, to possess a circular orbit. A third effect will be due to the quasi-viscous resistance acting in the line of the body's motion, hence it will fall slowly a victim to the solar gravitational pull. Steadily the body will spiral inwards, more quickly the smaller its size, the period of revolution becoming progressively less. Particles of a centimetre diameter are calculated to reach the sun from the earth in ninety million years, but if a thousandth of that size, in a thousandth of the time. Encke's comet shows a steadily diminishing interval between its successive returns, and this celestial object may prove ultimately to be shortening its period in obedience to light forces. These views have a new interest when the particles are very much smaller, such as compose the "coma" or tail of a comet. Calculations show that the pressure of sunlight can account for the well known deflection of a comet's tail away from the sun. Both the gravitational pull and the light pressure due to the sun follow the law of inverse square, the resultant acceleration following the same law and its value

falling off the smaller the diameter of the particles, and the smaller their density. Cometary matter is known to be repelled from the nucleus with a force much more powerful than the opposing attractive force of solar gravity, and the tails of comets have been classified on the basis of the ratio between the repulsive and the attractive force. In one class, the solar attraction is only partially neutralized; at the other end of the scale, the repulsion for some comets exceeds the attraction nineteen times. Over a certain range, the ratio of repulsive to attractive force increases inversely as the diameter of the particles, but a limit is reached when the size of the particle becomes comparable with the wave-length of maximum energy in the sun's spectrum; at this point diffraction effects come in as the particles no longer absorb or reflect in proportion to their sectional area. Arrhenius gives reasons for supposing the existence of particles with a density so low that the ratio between repulsion and attraction may rise to forty or more. These high ratios correspond to the nearly straight tails of comets which point from the sun, and which consist of particles streaming away at high velocities from the nucleus, on their way out of the solar system altogether, under the extreme repulsive influence of the solar rays.

The pressure of radiation is of further interest as an example of the interaction of ether and matter. Let us imagine a ball composed of some conducting material, having one hemisphere blackened and the other polished, also containing some source of thermal energy which maintains the temperature of the surface of the ball at a definite value. The blackened half will radiate more energy than the polished half, and the reaction on the former side will therefore be greater than on the latter, with result that the sphere will move off with acceleration, polished side foremost. Bearing in mind Newton's first and third laws, we cannot say in this case that a corresponding equal but opposite force will be manifested on some other material body in the region around, because there is none necessarily present. We can satisfy the principle of the conservation of momentum only by assuming the ether itself to stream away in the opposite direction. In doing this, we invoke the interaction of ether and matter, the ether being taken to possess inertia like ordinary matter.

Suppose we take another case of two equal spheres at the same temperature, and subject only to the forces arising from their own radiation pressure and their mutual gravitational attraction. Since the repulsive effect of one sphere on the other depends on the

product of their cross-sectional areas, whilst the gravitational pull is proportional to their masses, that is to the sixth power of the radius, it is evident that for a sufficiently small size of sphere the radiation pressure, insignificant for very large spheres, may be made to balance the gravitational pull. This is known to occur for a sphere up to a diameter of forty centimetres; but if the temperature of one sphere be raised, and that of the other be lowered by a corresponding amount, then the balance of forces is destroyed. Both spheres will set off with the same acceleration, the one chasing the other. Even though we have only one body with a uniform surface and at one temperature throughout, the emission of radiation brings into play an unbalanced force, if the body is in motion with respect to the ether. There will be a heaping up of energy in front and a thinning out behind; this involves an excess of back pressure on the advancing side, the excess being proportional to the velocity of the body, and the body will therefore slow down. Confining our conceptions, as we have done, to sensible material bodies, and ignoring any idea of a massive ether, we find in these examples evidence of an undoubted breakdown in the orthodox Newtonian laws of motion; for the existence of a radiation pressure, whether in action or reaction, is an experimentally observed fact.

From a different point of view, a similar conclusion is reached. Let us consider the possible variability of mass of a body. We know that a moving electron increases in mass with increase of speed; for slow speeds this effect is inappreciable, but at high velocities it becomes very large, tending to infinity as the speed of light is approached. Again, the effective mass of an atom may depend not only on the number of electrons it contains, but on their configuration. As the energy of the atom diminishes, it is supposed that the mass of associated ether diminishes too. If this attached ether is not subject to gravity, a difference in the ratio of mass to weight may be expected, say, in the case of radium and its presumptive parent uranium, since the amount of energy lost by the latter in passing into the former is very considerable. So also simple pendulums of the same length would vibrate in periods depending on the nature of the material of the bob; experimental facts, however, have not as yet shown any differences. If, on the other hand, the associated ether is subject to gravitation just like ordinary matter, loss of weight should take place as the result of any intense chemical reaction in closed vessels; so far as experiments in this direction have gone, the results are inconclusive.

We arrive then at this situation ; a change in mass involves clearly the breakdown of Newton's second law of motion, and it appears that, whilst this change does occur in the case of the single negative electron, yet no evidence of it is yet available in the case of ordinary matter, although the atoms of matter contain electrons in numbers of the order of their atomic weights.

IV.

It is well known that there are many cases in which chemical changes are brought about by the action of light, and, from the point of view of modern physics, we may regard the first stage in any photo-chemical reaction to be the partial or complete separation of negative electrons under the influence of light. From this aspect it is interesting to consider the latent image of the ordinary photographic plate.

In attempting to discuss the nature of the developable image produced on a photographic plate the first question which suggests itself is, does a chemical or a physical change take place in the silver salt when a latent image is produced? It is obvious that a chemical change must be preceded by a physical change; the question, therefore, is not whether the change is chemical or physical, but whether it is physical only, or whether it passes beyond the physical stage to an actual decomposition. It is doubtful whether it does go to the decomposition stage; in any case, the beginnings of photographic action involve an electronic discharge from the light sensitive molecule, and that the latent image is built up of ionized atoms or molecules, upon which the chemical effects of the developer are directed subsequently. In support of this is the fact recorded by Dewar, that the latent image is formed at temperatures approaching the absolute zero. This compels us to regard the fundamental effects in the film as other than those of a purely chemical nature, and to seek for the foundations of photographic action in some physical or intra-atomic effect; such an effect is photo-electric action.

The haloid salts of silver are vigorously actino-electric, and possess an activity in the descending order of bromide, chloride and iodide, which is the order of their photographic sensitiveness. Sensitizers are also actino-electric, their activity being dependent on the absorption of light of some particular colour. An efficient sensitizer must dye the silver halide grain and not merely stain the plate. It is also noticeable that the photographic image is produced

by Röntgen and by Becquerel radiations, which both are active ionizing agents. In a recent work, Sheppard and Mees suggest the view that ionization brings about a chemical change, and that the chemical product is the so-called latent image. Their idea is that a half-halide is formed and present in solid solution in the remaining halide. This view is widely accepted at the present time, though it is doubtful whether any direct evidence has been produced to prove that halogen is set free in the production of a normal latent image. There are many substances known to be halogen absorbents, which have no influence in affecting the rate of production of a latent image, though most of them do affect the rate of production of a visible image when it is certain that halogen is being set free.

It is convenient to examine the physical theory of the latent image, as based on actino-electric action, by means of the following hypothesis. Let us suppose that a gel containing grains of silver halide is illuminated by monochromatic light; photo-electrons will be liberated from each grain, and, in accordance with the results obtained with metal surfaces, the maximum velocity may be taken as dependent on the wave-length of the light, the velocity increasing as the wave-length diminishes. The liberated electrons, after moving for a short time amongst the surrounding molecules, just as the molecules of air are supposed to move in the interior of a sponge, become attached to neighbouring molecules of the gel. When the illumination ceases a fairly stable arrangement results, consisting of a central grain which is charged positively surrounded by a portion of the gel, roughly spherical in form, in which negative electrons are disseminated. The radius of the sphere will depend upon the velocity of electron emission, that is, on the wave-length of the exciting light. The latent image thus formed is not absolutely permanent, and the gradual destruction of the image or retrogression is to be explained by the gradual return of electrons to the parent atom. It is significant that photo-retrogression is always very marked in the case of plates, films, or papers kept undeveloped at temperatures from 40° to 48° C. for a few days, while it is not noticeable, even after weeks, if the temperature be from 1° to 6° C. This agrees with the increased rate of decay of phosphorescence observed to arise from increase of temperature, and may be explained as a consequence of an increased rate of vibration of the molecules to which the electrons are attached, and whereby the chance of the return of an electron to the grain of silver halide is increased. An objection to this physical theory of the latent image lies on the ground that the assumed stability

of the free electric charges is unexplained. The only answer to this seems to be that those charges are within the substance of the solid material. It is interesting and significant in connexion with this objection to recall the fact that in the old Daguerrotype process the latent image was so evanescent that it was necessary to develop quickly after the exposure. The weight of evidence seems to point to the view that the production of luminescence and the formation of the latent image in photography are analogous processes, each being due to the liberation of photo-electrons by light.

Closely allied to this subject is the problem of photographic reversal. It has been proved experimentally that the mass of silver reduced per unit area of a photographic plate is proportional to the density measured photometrically. The relation between the density of the developed plate and the period of exposure is marked; the density increasing rapidly at first, then more slowly, until a maximum is reached. If the exposure be prolonged, density diminishes and reversal of the image sets in; at a later stage, the density has a minimum value corresponding to a destruction of the image. If we adopt the theory already outlined, a certain amount of light may be thrown on these phenomena. Assuming that the electrons expelled from the silver halide become attached to molecules of the surrounding dielectric, if those molecules are vibrated by some stimulus, such as long wave-length radiation, then the electrons are enabled to enter again into combination with the atoms from which they were liberated. This re-combination is of course effected by the electrostatic forces between the oppositely-charged particles; if re-combination is not assisted in this way, the electrostatic field will increase under the continued action of light, until spontaneous neutralization takes place with destruction of the latent image.

Under this conception, there are two processes that may bring about, either independently or in conjunction, the destruction of the latent image, namely, an increase in the motion of vibration of the molecules and an accumulation of electric charges of opposite sign.

When a photographic plate is exposed to a number of stimuli in succession, the effect produced would seem to depend on the order in which the exposures are made. One stimulus differs from another in the velocity with which the electrons are ejected from the atom, and perhaps also in the class of electron. Considering only differences in velocity, let us suppose that two exposures are made: the first causing an emission of electrons with high velocity,

the second causing electrons to be set free with a lower velocity. Under the circumstances, we should expect the electrons to be arranged in concentric spherical shells. An important effect will be that the presence of the charges due to the first stimulus sets up an electric field opposing the emission of the slower electrons due to the second stimulus; in consequence, the velocity of these will be further reduced, and they will not be able to travel so far from the parent atoms. Thus, the radius of the inner shell will be decreased, and the stage at which spontaneous neutralization of the charge within this shell takes place will be the more readily reached. The disturbance produced by this neutralization will be sufficient to upset the equilibrium of the particles at a greater distance from the centre, so that the electrons in the outer shell under the influence of the central attraction will effect their return to the silver halide grains. In this way, destruction of the latent image readily comes about.

The purely physical or electronic theory of the developable image in a photographic plate or film, here explained or outlined, seems to present more flexibility than any purely chemical theory of the process; it is noticeable too, that supporters of a chemical concept of the phenomena have been compelled to suggest the existence of two or three different latent images, or two or three sub-halides in order to account for the complex facts. This complexity is accentuated by a study of the photographic action of both the Röntgen and Becquerel radiations. The physical theory explains the differences by the conception of variations in the velocity and resulting displacement of the electrons; it affords a clue for disentanglement of the phenomena of reversal, the effect of variation in the size of the grain and of the composition of the emulsion; and finally, it suggests a field for further research in connection with the photo-electric activity of the substances employed, the penetrating power of the electrons and the dielectric properties of the binding material. Without going so far as to say that it gives the whole and final answer to a series of difficult questions, the purely physical theory of the latent image in photography seems to fulfil requirements more satisfactorily than any other hypothesis.

V.

Most of us are familiar with the so-called "northern lights" in our own latitudes, and been fascinated by the descriptions and pictures of the real aurora as given in books of arctic or antarctic travel. The recent accessions to our knowledge in regard to the

electric discharge in gases suggest a way towards a better elucidation of the inner mechanism of the phenomenon.

As seen in high latitudes, the characteristic form of the aurora is that of a luminous arc, the highest point of which is in or very near the magnetic meridian. Within this arch of light the sky is comparatively dark, but from the upper edge streamers radiate into the sky, constituting as it were spokes of light, their upper ends fading to extinction or sometimes converging to form the corona. As regards colour, a rosy tint is often seen at the base of the auroral arc but, higher up, the prevailing colour is a whitish yellow passing into green at the highest points of the streamers. The rose tint is due mainly to neon, and the characteristic yellowish green to krypton. Very rapid movement is seen, sometimes it is one of rotation about the earth's magnetic axis, the bases of the streamers gliding as it were along the arc, or, the effect is one of displacement of the streamers in the direction of their length. As seen in high latitudes, the height of the auroral arc is but some thirty or forty miles, but in our own latitudes the height is some hundreds of miles. In extent, auroras may be local or they may cover the whole of our globe, these large displays occurring simultaneously in both hemispheres; the effects are totally masked in the daytime by the sunlight, but their maximum is usually a few hours after sunset, the intensity at an equal interval before sunrise being incomparably feebler.

The question is, what is the nature of the phenomenon? Early work throws little light on the problem, other than to suggest that the aurora is an electrical phenomenon and susceptible to a magnetic field. Many physicists have suggested that auroral phenomena are due to electric discharges like to the cathode discharge in a vacuum tube, and this view is generally held. The latest work of Villard reproduces many of the characteristic effects of structure and movement in the aurora by the action on a beam of cathode rays of a magnetic field, similar to the terrestrial magnetic field. When the beam is shot at right angles to a uniform magnetic field, the path of the rays is a circle having a radius inversely proportional to the strength of the field; when the beam is shot obliquely in the uniform field, the resultant path of the rays is a spiral of constant pitch, whose axis is parallel to the field. An analysis of the facts indicates the particles to be travelling on a spiral path whose axial direction makes an angle with the meridional planes of the field, but the general movement of individual particles is parallel to the axis of the field and this involves passage into the stronger field

near a pole. This causes the pitch of the spiral to diminish and results ultimately in a reversal of its path, so that the beam spirals back to the other pole, there again to suffer a reversal of direction and so on. Thus, a zigzag becomes described over a surface whose axis is that of the magnetic field. To an observer situated in the field between the poles, and looking in the direction of the North Pole, the kathode particles would describe spirals in the clock direction, the resulting zigzag line being such as to carry the particles from west to east.

Applying these experimental facts towards an explanation of the natural aurora, we must imagine the vacuum bulb and magnetic field expanded to the size of the earth. The consecutive elements of the zigzag cathodic path represent luminous streamers converging to the poles, but stopping at a distance from them and resting, as it were, on arcs with black interiors. At either arc, and some distance from it, two adjacent beams, one incoming, the other outgoing, will overlap and so give an increased brightness. If the step of the zigzag is greater than the breadth of the beam, a fantail appearance will result; if less, then overlapping ensues causing a drapery effect. A change in the strength of the magnetic field or of the speed of the rays will alter the step of the spiral or zigzag, and so cause an apparent sliding movement of the bases of the beams of the auroral arc. Any change in the point of convergence of the field will cause a movement of the arc up and down, just as in the so-called dance of the rays. The first movement can be produced in the vacuum bulb by altering the strength of the magnet, and the second by the approach of a piece of soft iron near to a pole. The earth's path in the magnetic field is from west to east and, therefore, fades in intensity as one travels east, dying away after a certain fraction of a rotation is completed. This explains why the aurora is seen best soon after sunset, afterwards fading away as the place of observation is carried by the earth's rotation further east of the meridian containing the sun.

In comparing different explanations of the aurora and magnetic storms or magnetic variations we have to bear in mind the energy point of view. Some physicists have inclined to ascribe the source of energy to the sun; a great objection to this idea lies in the fact that the sun would have to emit as much radiation in the course of the few hours of a magnetic storm as it does normally in the course of several months. The plausibility and possibility of a limited beam of kathode rays originating in a sun-spot area does not appear to get over the objection satisfactorily; a better explanation

perhaps is, that the source of the energy lies in the kinetic energy of the earth's rotation, the mode of transformation being by the movement of masses of air across the earth's lines of force, whereby electromotive forces are induced. Electrical energy being the product of volts and amperes, electrons emitted or ultra-violet radiation from the sun would play the rôle of increasing the conductivity of the paths of the induced currents. Such emissions would leave the sun positively electrified and the effect would cease; even then, local rises in temperature, such as are believed to occur in sun-spots, might permit the effect to be resumed, at least for a time. From the point of view of Villard's experiments, the origin of the cathodic streams may be terrestrial; were they of solar origin the extent of the auroral phenomenon should be a surface of a radius of the earth's orbit, as the place of origin must lie on the trajectory of the particles. Whilst regarding the source of the auroral rays as uncertain, Villard suggests the possibility of its being in the masses of electrified ice particles constituting cirrus. He regards the undoubted influence of the sun as a mere trigger effect; possibly the cirrus clouds may act as great secondary kathodes, excited by the bombardment of electrons from the sun; or the negative electricity may be discharged by the incidence of ultra-violet rays, as ice crystals negatively charged show photo-electric effects. The kathode beam would be shot perpendicularly to the surface of the cloud and thus obliquely to the earth's lines of magnetic force. The resultant path would be practically as that described in Villard's experiments, with this difference, however, that the zigzag or spiral would be on a gigantic scale, having the earth's north and south magnetic poles as the turning or reversal points.

VI.

The modern development of colloidal chemistry, which deals with matter in a state of extreme subdivision and therefore with a great development of surface for a given mass, has directed an increasing attention to the subject of surface tension. One has looked into a number of text-books on physics, but failed to find any lucid explanation of this phenomenon; to the reader, anxious to be up-to-date, this elementary noting may be of interest.

As we do our morning shave and dip the brush in water, we notice that the bristles separate but collapse and adhere together the moment we withdraw them from the water. In this daily incident, we have an example of surface tension or a series of

liquid surfaces in a condition of tension. Strictly speaking, we are here dealing with a number of adhering water surfaces behaving like an elastic sheath or tending to contract. A more erudite example of the phenomenon and more helpful to its right understanding is afforded by a piece of wire bent into the form as given in the accompanying figure. If we slide another but movable piece of wire C-D on to the legs of the other we construct a rectangular area A-B, C-D, with a film of liquid, the film will not only hold the movable suspended wire but, by contraction, actually raise that wire. By weighting the latter, we can determine a weight which will stretch the liquid film indefinitely and, as the film has two surfaces, the weight marks the double surface tension exerted for the length of

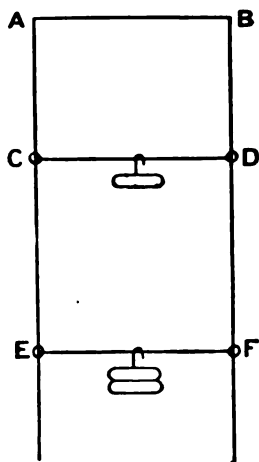


FIG. 2.

the wire C-D. Consequently, if we divide half the weight by the length of the wire, we get an expression of the surface tension per unit length. It is customary to express the value either as milligrammes per millimetre, or as absolute units which are dynes per centimetre. Here it may be useful to explain that a dyne is the force which moves one gramme at a velocity of one centimetre per second; further, the work done when one dyne moves the object to which it is applied through a distance of one centimetre is called an erg; milligrammes per millimetre are converted into ergs or dynes per centimetre by multiplying by 9.8. Some idea of the magnitudes involved is given by the facts that the surface tension

of water at 18°C . is 73 ergs, of ethyl alcohol at 20°C . is 22 ergs, and of mercury at 15°C . is 436 ergs.

If, instead of a liquid film, we had an elastic membrane of indiarubber stretched over the rectangular space, a given weight which that film could support would depend upon the elasticity and size of the film surface, increasing with the extension of the surface. In the case of our hypothetical liquid film, the possibility of stretching it indefinitely indicates that its surface tension per unit length is independent of the size of the surface; therein lies the important difference between surface tension and the tension of an elastic membrane. If we assume that the length of the wire C-D be unit length and move that wire, with the observed weight equal to the surface tension per unit length, to the point E-F or through a distance equalling that unit length, then we increase the surface by unity and the surface tension or work done is measured by the weight multiplied by the distance through which it moves the body acted upon, in other words, the work done is the product of surface tension by unity; or the temperature being constant, the work done when the surface is increased by unity is the value of the surface tension. One lays stress on the condition of a constant temperature, as the value of surface tension varies with temperature; decreasing as the temperature rises, and becoming zero at the critical temperature for the particular liquid.

The relation of surface tension to temperature is somewhat complicated. We know that air becomes hotter when it is compressed and thereby tends to expand or resist the compression; so also, the solution of a salt in water causes cooling, this being a change which affords resistance to further solution. These are examples of the principle that, when the state of a system is changed, the system alters so as to oppose a greater resistance to that change. On this same principle if a liquid film be suddenly stretched, it cools, because its surface tension is thereby increased and the cooling opposes a greater resistance to further stretching. It follows from this that, if a surface is increased, without a change in temperature, heat must flow into the film surface to keep its temperature constant. The total energy of the surface, therefore, consists of two terms of which one represents the work done against surface tension and the other the inflow of heat during the extension of the surface, which also increases the energy. Thus with water at 0°C . the surface tension is 75 ergs, and the work needed to produce one square centimetre of surface is 75 ergs;

in addition, there is an influx of heat which in terms of units of work equals 40 ergs, making the total work to be 115 ergs. The decrease in surface tension caused by an increase in temperature is paralleled by expansion, or that change produced in a liquid by increasing temperature. Measurements show that the temperature coefficient of surface tension or the decrease caused by a rise in temperature of one degree, follows closely the coefficient of expansion, the greater the latter the greater also is the decrease in surface tension per degree, and the ratio is approximately 2.5 for a very large number of liquids.

The theory of surface tension is based on the assumption that molecules of liquids and gases, or solids, attract one another with forces acting over very small distances only. The distance beyond which this becomes imperceptible is known as the radius of molecular action, and for liquids generally it is estimated to be about five micro-millimetres. It is obvious that the molecules in a liquid are subject to attraction in all directions, and that at the surface the molecules will be subject to an unbalanced attraction from the more adjacent molecules in the interior; in other words, to an increased pull which keeps the surface in a state of tension. The effect of this mutual attraction between molecules must be the same as that of a pressure existing in the liquid, commonly called the intrinsic pressure. This intrinsic pressure gives a cohesion or tensile strength and offers a resistance to any force tending to enlarge its volume. In gases, the smallness of the radius of molecular action makes us conceive the attraction between them to be slight, but if we bear in mind that the intrinsic pressure of a gas is proportional to the number of attracting molecules and to the number of attracted molecules, that is proportional to the square of the number of molecules, and that the number of molecules in unit volume is proportional to density, we realize that the intrinsic pressure is proportional to the square of the gas density. Calculations on this conception indicate the intrinsic pressure of water to be quite 11,000 atmospheres, for ethyl alcohol it is 2,400, and for ether is 1,400 atmospheres. The magnitude of this cohesive force is surprising, but its evaluation is confirmed by a consideration of the latent heat of vaporization, or the amount of heat required to transform one gramme of liquid into vapour without changing its temperature. For water, at 100° C., the latent heat is 540 calories. To establish a connection between this and the intrinsic pressure we need to consider the work done in vaporizing a liquid. This is of two kinds: molecules must be brought from the interior to the

surface of a liquid against the pull exerted by the rest of the liquid, and the vapour thus produced must lift the superincumbent atmosphere. The portion of latent heat used in doing the first part of the work is the internal latent heat, since it arises from internal cohesive forces, and for water is 500 calories at 100° C.; while the portion used to overcome atmospheric pressure is the external latent heat, which for water at 100° C. is 40 calories, depending on the volume of vapour and the atmospheric pressure to be overcome. As long as the molecule is in the interior of the liquid, the forces to which it is subject are equal in all directions, but different when it approaches the surface and out of effective range of the radius of molecular attraction. So far, no numerical expression has been found for these forces expressive of the connection between intrinsic pressure and surface tension; it is obvious that high intrinsic pressure must be accompanied by high surface tension, since the latter is but a manifestation of the same cohesive force as causes intrinsic pressure.

If the preceding facts and arguments have been understood, it follows that a high intrinsic pressure means a low compressibility and vice versa. This is so, but it is affected by vapour pressure. A bubble of air in a liquid is spherical and this spherical shape can be maintained only if the inside pressure is greater than the outside. The excess pressure is inversely proportional to the radius of the sphere and consequently is very considerable for small bubbles. As it balances the surface tension, a further rise in pressure is necessary if the bubble is to expand. If, therefore, only small bubbles of vapour are found in a liquid, the temperature must be raised much above the boiling point before the bubbles expand and the act of boiling occurs: when it does happen, it is sudden and violent, familiar to us in the so-called "bumping." The cause of the pressure is the vapour pressure, and it can be shown by mathematical arguments, undesirable to reproduce here, that the vapour pressure on a convex surface is greater than on a plane surface and that the smaller the radius of curvature the greater is the difference between the vapour pressure at the curved and plane surfaces. For very small radius values, the difference is marked; thus, a drop of water, at 0° , with a radius of one micro-millimetre, or 0.001 mm., has an equilibrium of vapour pressure greater than that of an equal plane surface by one part in a thousand, but if the radius be only 10^{-6} mm. or a thousandth of a micro-millimetre, the equilibrium pressure required is more than double that at the plane surface. When drops are in a vapour which has a pressure

corresponding to a plane surface, they will evaporate rapidly and, similarly, when there is a mixture of small and large drops, the latter will grow at the expense of the former. In air which is free from dust, the high vapour pressure of minute drops makes their condensation difficult; if dust particles be present, they act as nuclei, enlarging the radius of the drops, and thereby reducing their vapour pressure and tendency to evaporate. Analogous considerations apply to porous bodies which are nothing more than a collection of capillary tubes. If the liquid whose vapour is present wets the porous body, the resulting surfaces are concave and the equilibrium pressure is lowered, so that condensation in the pores takes place readily. This accounts in part for the absorption of water by wool, flannel and cotton, though possibly adsorption plays a part.

One alluded just now to the growth of large liquid drops at the expense of small ones. Since the large drop has a smaller surface than an equal volume of small ones, the transfer of a quantity of liquid from one to the other leads to a decrease of surface energy, and the liquid is taken from a higher to a lower plane of vapour pressure. The growth of particles in a precipitate, or the formation of crystals, is analogous; the only difference being that here we are dealing with a decrease in energy of a surface of solid liquid instead of liquid vapour, and the transfer of matter from a place where the osmotic pressure, instead of the vapour pressure, is higher to one where it is lower. The osmotic pressure is proportional to the number of molecules dissolved in the same volume, and varies with the solubilities of large and small particles. Substituting solubility for pressure, the analogy is capable of mathematical proof; and the results confirm the conclusion that the surface tensions of solids have high values.

From what has been stated, it is obvious that a connection exists between surface tension and a number of physical properties, and mathematically that relation is expressible as a term known as the constant of specific cohesion and, for a large number of liquids independent of their nature, has a value of 2.1. Further, theoretical and experimental evidence points to the existence of a transition layer at the boundary of two phases, in other words, of a layer in which the concentration of the phases is different from that in the bulk. This factor, as affecting the concentration, is of importance as influencing the distribution of a solute in a solvent, and many of the anomalies and difficulties concerning surface tension are explicable by the electrical charges which exist on

particles; this factor of the electrical charge has especial value in the case of electrolytes, when the ions are known to be charged. In the case of a liquid drop, which is a sphere, its surface tension would cause it to assume a minimum surface area, and the effect of an electric charge is to oppose this, with the net result that the liquid behaves as if it had a reduced surface tension, simply owing to the outward pull of the lines of electric force. It is well known that surface tension makes the initial stages of condensation more difficult; consequently, if droplets form on any small electrically charged bodies, the deterrent effect of the surface tension is reduced, and condensation accelerated. From experiments made as to the exact effect of electrification on surface tension, it is presumable and most probable that, whenever two immiscible substances are brought together, a double layer of electricity results at the interface, one being positive and the other negative; but it is still doubtful whether in all cases the iso-electric point corresponds with the condition of maximum surface tension. If solutions of two electrolytes are brought into contact, there is, generally speaking, a potential difference between them, and this difference depends on the difference in the concentrations and the velocity of the ions. This brings us practically to the conception of an adsorption of ions; the dynamics of this are not well understood, and it does not seem possible to devise any experimental methods for measuring such an effect. In interpreting these complicated phenomena, we are confronted really with the difficulty of our ignorance of the laws governing the adsorption of ions and the general difficulty of all adsorption phenomena on solid surfaces. The latter are supposed to be dominated by a reduced surface energy, but there are no means of measuring this surface energy, and more particularly the surface tension of solid-liquid, and we can but assume that the behaviour for a given solution, in contact with a solid, is parallel to that of liquid-liquid or liquid-gas surfaces, an assumption equally incapable of proof. On the whole, we can say that surface tension is a complex of many factors, many of which are only imperfectly understood, but the weight of evidence emphasizes the importance of the existence of a double electric layer where the two surfaces meet, and that the double layer is largely or entirely due to the ordinary adsorption of ions, which narrows the issue down to a question of electric potential. To put it plainly, even surface tension seems to be a mere matter of surface energy expressible in terms of electricity.

I close these notes with apologies to the reader for their



superficiality. The topics touched on are admittedly difficult, and each deserves an article to itself, but those I am hardly capable of writing. Anyhow, the notes have been contributed to our Journal essentially with the purpose of directing attention to subjects of profound interest and, perhaps, as a lead over fences in a sphere of reading obviously bristling with obstacles. One only hopes that they will be acceptable and received sympathetically, and as an earnest that we can, and do, think of scientific matters outside our own immediate profession. Unless we do so think and try to know, we belie our claim to be scientific men and, moreover, handicap ourselves in the endeavour to advance and rightly understand many of the fundamentals of our own calling.

TREATMENT OF GUNSHOT WOUNDS BY EXCISION AND PRIMARY SUTURE.

BY COLONEL H. M. W. GRAY.

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THE number of cases to which this treatment is applicable makes ample justification for attempting to make the method more widely known and popular. I began this method of treatment of certain lacerated "furrow" wounds in November, 1914, and was so impressed by its utility that I have since then urged that it should be carried out whenever possible. The advantages claimed for its use are:—

(1) Healing by first intention is assured in the vast majority of properly selected cases.

(2) Much time is thereby saved. Some wounds, which would otherwise require months to heal, are soundly united in the course of ten to fourteen days. The soldier is thus available for duty again at a much earlier date.

(3) The amount of attention required to be given by the medical officers, nursing sisters, etc., is greatly reduced.

(4) Much pain is avoided.

(5) The amount of dressings required is reduced to a minimum and in this way expense is lessened.

(6) Complications which may arise from the presence of a septic wound are avoided.

(7) A more sightly scar is obtained.

(8) Because of the absence of contraction which would accompany formation of a large cicatrix, there is less impairment of function in the part concerned.

(9) In the case of head injuries, excision of the wound, especially in some, apparently trivial, injuries, provides a means of ascertaining, with greater certainty than by any other method, whether depressed fracture and injury to the brain coexist.

Healing by first intention may be procured in practically all cases in which the surfaces of the new wound can be brought into accurate approximation without much tension. In rare cases, when the wound is deep, approximation in the depth has to be dispensed with and drains are introduced for a short period, until one is assured that aseptic healing will occur. In some cases it is

necessary to adjust and fix the parts of the body adjacent to the sutured wound so that the fullest relaxation is secured.

The mere length of a wound is no bar to operation. Some very long wounds have been excised. A missile may inflict what resembles an incised wound and, because dividing the tissues at right angles to the line of their greatest tension, may, owing to the contractility of these tissues, cause a large gaping wound. In such cases there will be but little tension when sutures are inserted and tied, if too great a mass has not to be excised. One can test roughly what the amount of such tension will be, by attempting to push the surfaces of the wound together.

It is not necessary to wait until the wound is surgically clean; in fact, in most cases the sooner the excision is made the better. The wound will probably be soundly healed in a shorter time than it will take to clean. During the "cleaning" process the adjacent parts become so softened that sutures do not hold well. Only when a large "bank" of inflamed tissue surrounds the wound is immediate excision inadvisable on account of the septic condition of the wound. In such cases it is probable that organisms have penetrated to a considerable depth and will cause trouble when the tissues invaded by them are subjected to the pressure of sutures. By vigorous "salting" (hypertonic treatment) such wounds are usually rendered suitable for excision in twenty-four to forty-eight hours. Other contra-indications are the presence of marked pocketing in the wound and the exposure of vascular or nerve trunks in the depth or of bone which it is inadvisable or impossible to remove.

In any case excision of the soiled edges of skin and of the superficial connective tissue and muscle may be done with advantage. The healing process in the wound as a whole is thereby accelerated.

Certain bony prominences, such as a vertebral spine or the edge of the acromion process, may be capable of removal with the other infected tissues. The presence of pocketing in a wound is very important. If part of such a pocket, or, indeed, if any septic focus be left, the operation will probably prove a failure.

The technique is therefore very important. The operation can usually be done under infiltration anæsthesia of the neighbouring parts. It is well to add plenty of adrenalin to the anæsthetic solution so that hæmorrhage during the operation is avoided. Accurate hæmostasis is important for success.

The parts around are shaved and disinfected very thoroughly. The wound is wiped out, dried, and packed with gauze.

For disinfecting purposes in these cases I favour the use of very strong iodine solution (five to ten per cent. in spirit or ether). This is painted thoroughly into every part of the wound and over the surrounding skin for a considerable area. It has the effect of drying the surface of the wound in a remarkable manner. The strong iodine is wiped off the skin with spirit or ether at the end of the operation.

The skin close to each extremity of the wound is caught up by a tissue forceps or loop of thread and slight traction is made in a direction away from the centre of the wound at an angle of about forty-five degrees with the sound skin. The whole wound is then cut away *en masse* (skin, flesh, and, if necessary, bone) at a distance of about one-third to half an inch from the raw surface. Care must be taken that pockets or general surfaces of the wound are not cut into during this procedure. Bony prominences are removed along with the soft parts by dividing them with bone-pliers, gouge-forceps or chisel. If the wound is deep it is sometimes of advantage to insert the finger into the wound as a guide to where the tissues must be divided.

A very sharp scalpel is invaluable. Cutting out the wound in pieces makes success precarious.

The new wound surfaces should now be washed out with saline solution and packed with gauze, and the surrounding skin wiped free of blood or discharge. Fresh towels, fresh instruments, and if the wound has been handled, fresh gloves should now be used.

The wound should be closed by wide sutures which underrun its floor so that no dead spaces are left. It may be necessary to suture in layers. If so, the suture of each layer should include some of the tissue of the deeper layer. The skin should be accurately approximated by a few fine sutures. Further relaxation sutures are not often necessary.

The following dressing should then be applied. The line of sutures and the adjacent skin for several inches should be painted with a wound varnish, of which mastic, dissolved in some rapidly evaporating solvent, forms the important part (forty to fifty per cent.). When the varnish has become "sticky" (after one and a half to two minutes), a covering of gauze, at least two layers thick, should be stretched tightly and smoothly over the sticky area, gently patted down, and cotton-wool and bandages applied fairly firmly. If it is desired to inspect the wound at any time, after removing the bandage and wool, the top layer or layers of gauze should be peeled off by traction at right angles to the surface, the

layer next the skin and wound being at the same time retained by the other hand. Perfectly satisfactory inspection can be made through the single layer of gauze. The loose edges of the gauze should be neatly trimmed. In many cases no further dressing is required until the stitches are to be removed. The final layer of gauze is then peeled off.

If fine catgut sutures have been used for the skin, it is often found that the knots come away with the layer of gauze, the deeper parts having been digested. A fresh application of the mastic varnish and gauze should then be made and left until the wound is firmly healed.

The varnish should on no account be painted over the gauze after it has been applied, otherwise the gauze cannot be peeled off as described. The varnish and gauze dressing is important for success. It is the best I know. It gives wide support, relieves tension and prevents any dragging on the stitches. These factors are of great value in preventing stitch abscess.

NOTES ON THE PREVALENCE OF CEREBROSPINAL FEVER AMONG THE CIVIL POPULATION OF ENGLAND AND WALES DURING THE LAST FOUR MONTHS OF THE YEAR 1914 AND THE FIRST SIX MONTHS OF THE YEAR 1915; TOGETHER WITH A SHORT ACCOUNT OF THE APPEARANCE OF THE DISEASE AND OF ITS DISTRIBUTION AMONG TROOPS IN THE BRITISH ISLES DURING THE SAME PERIOD, AND OF THE MILITARY ADMINISTRATIVE MEASURES ADOPTED TO DEAL WITH PREVALENCE OF THE DISEASE.

BY SURGEON-COLONEL R. J. REECE, M.D.CANTAB.

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ON the appearance of cases of cerebrospinal fever among the troops in England I was seconded from my regiment for the purpose of arranging, under the directions of Colonel Horrocks, K.H.S., a comprehensive scheme for dealing with outbreaks of this malady.

Many factors will need to be considered before any mature account can be rendered on the subject. Meantime the following notes on the circumstances under which cerebrospinal fever became epidemic in this country and on the administrative action taken to limit its extension among our troops may prove of interest.

The earliest records of cerebrospinal fever date from the year 1805. In his historical treatise Hirsch, who wrote in 1881 to 1886, recognizes four distinct epidemic periods. In the first of his periods, 1805 to 1830, the disease appeared in isolated epidemics in various places in Europe, but was more general in the United States. His second period extended from 1837 to 1850, during which there were widespread epidemics in France, Italy, Denmark, Algiers, and the United States. In his third period, 1854 to 1875, the disease was widely spread throughout Europe, the adjoining countries of nearer Asia, and some parts of Africa; also it appeared in South America and was again prevalent in the United States. In Hirsch's fourth period, 1876 to 1886, there were comparatively small epidemic outbreaks within the former distribution areas. Since Hirsch wrote, the disease, although it has appeared in several places and assumed

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epidemic proportions from time to time, has not been in any sense pandemic. While Mexico, Central America, the West Indies, and South America have suffered very little from the disease, the United States have experienced considerable incidence; all the States have been affected and the disease has appeared in Canada. In the British Isles the disease appeared in Dublin in 1886, in Glasgow and Belfast in 1907, and in Swansea in 1908.

In view of indication of increasing prevalence of cerebrospinal fever, the disease was made compulsorily notifiable in England and Wales on September 1, 1912, and from that date the distribution and the extent of the prevalence of the disease can be determined for this country with some measure of exactness. It is possible that cases have from various causes escaped notification, and it is also possible that cases have been notified as cerebrospinal fever which were not associated with the meningococcus.

My present object is not to attempt any lengthy description of the epidemiology, etiology, bacteriology, and the symptoms of cerebrospinal fever. I seek only to give indication of the distribution of the disease, of the extent of its prevalence at the time when the malady first appeared among our troops, and of the administrative steps taken to meet this occurrence, while noting in some detail the behaviour of the disease in the latter months of the year 1914 and in the first six or seven months of the present year.

There were notified, in the civil population, in England and Wales during the year 1913, 279 cases of cerebrospinal fever and particulars of 276 of these were obtained; in 1914 there came to notice 300 cases.

The following table gives for the two years the percentage of attacks on males and females, the percentage of cases in age-groups, and the fatality per one hundred cases. The figures relate only to cases occurring in the civilian population.

Year	PERCENTAGE OF TOTAL ATTACKS		PERCENTAGE OF TOTAL CASES IN AGE-GROUPS			Fatality per 100 cases
	Males	Females	0-5	5-15	15 +	
1913	55·8	44·2	43·1	35·1	21·8	69·6
1914	57·7	42·3	51·3	31·3	17·3	68·7

Thus in these two years, during which cerebrospinal fever was in no sense epidemic, the greatest incidence fell on children under 15 years of age (80·6 per cent.), the case fatality was high, and males suffered more than females.

Cerebrospinal fever is principally a disease of towns. Its distribution in London, urban districts, and rural districts during the two years 1913 and 1914 is shown in the following table:—

Year	PERCENTAGE OF TOTAL KNOWN CASES OCCURRING IN			
	London	Urban districts	Rural districts	
1913	31.2	52.5	16.3	= 100
1914	23.3	66.3	10.3	= 99.9

It is possible that this excess in urban districts is in part explicable by the fact that some cases from rural districts find their way into hospitals situated in urban districts without recognition of their nature in the rural districts in which they have occurred. However this may be, in terms of population the attack-rate is approximately half as great again in urban as in rural districts.

Also in terms of population the attack-rate during the year 1914, on the population living at certain age-periods, shows that the incidence of attack decreases with advancing age.

The table on next page shows week by week the number of notified cases of cerebrospinal fever, and their topographical distribution in the civil population during the last four months of the year 1914.

The foregoing account indicates the general circumstances regarding the prevalence of cerebrospinal fever in the civil population during the time when we were called on to deal with the outbreak in the troops. Of the cases notified among the civil population during the week ending December 26, those occurring in the Hambleton and Pewsey Rural Districts and in the City of Salisbury were the first associated with military cases.

The first military case which occurred after mobilization was a Somersetshire yeoman who was attacked at Great Bentley in Essex. The first symptoms of his illness appeared on September 19, 1914; he went home on furlough on September 23 to Taunton, where he died on October 4, 1914. No other cases occurred in his regiment. The case of cerebrospinal fever notified in the civil population at Woodford, Essex, in the week ending September 19, appeared to have no relation to this military case; Great Bentley is fifty miles distant in a straight line from Woodford.

The next military case notified was on October 18, the patient being a soldier of the Canadian contingent in the Bustard Camp

TABLE SHOWING FOR THE CIVIL POPULATION THE TOTAL NUMBER OF CASES OF CEREBROSPINAL FEVER NOTIFIED WEEK BY WEEK, FROM THE WEEK ENDING SEPTEMBER 5, 1914, TO THE WEEK ENDING JANUARY 2, 1915, TOGETHER WITH THEIR DISTRIBUTION IN LONDON, AND IN URBAN AND RURAL DISTRICTS IN COUNTIES IN ENGLAND AND WALES.

Week ending	Total number of cases in England and Wales	Number of cases in London	Counties	Urban districts	Number of cases	Rural districts	Number of cases
Sept. 5, 1914	10	3	Lancashire ..	Eccles ..	1	..	..
			" ..	Liverpool ..	2	..	..
			" ..	Manchester ..	1	..	..
			" ..	Salford ..	1	..	..
			Warwickshire ..	Birmingham ..	1	..	..
			Glamorganshire ..	Swansea ..	1	..	..
" 12 "	8	4	Lancashire ..	Liverpool ..	2	..	..
			Warwickshire ..	Birmingham ..	1	..	..
			Somersetshire ..	.. ..	..	Williton ..	1
" 19 "	8	2	Essex ..	Woodford ..	1	..	..
			Gloucestershire ..	Bristol ..	1	..	..
			Lancashire ..	Salford ..	1	..	..
			Middlesex ..	Willesden ..	1	..	..
			Somersetshire ..	Minehead ..	1	..	..
			Monmouthshire ..	Tredegar ..	1	..	..
" 26 "	1	1	.. ..	.. ..	..	..	..
Oct. 3 "	3	..	Lancashire ..	Liverpool ..	1	..	..
			Warwickshire ..	Birmingham ..	1	..	..
			Yorks, W.R. ..	Wombwell ..	1	..	..
" 10 "	7	..	Essex ..	West Ham ..	1	..	..
			Gloucestershire ..	Bristol ..	2	..	..
			Lancashire ..	Liverpool ..	2	..	..
			Norfolk ..	Norwich ..	1	..	..
			Leicestershire ..	.. ..	..	Barrow-upon-Soar ..	1
" 17 "	2	1	Southants ..	Gosport and Alverstoke ..	1	..	..
" 24 "	5	..	Chester ..	Wallasey ..	1	..	..
			Lancashire ..	Liverpool ..	1	..	..
			Northumberland ..	Tynemouth ..	2	..	..
			Suffolk, East ..	.. ..	..	Blything ..	1
" 31 "	6	2	Chester ..	.. ..	..	Northwich ..	1
			Lancashire ..	Leigh ..	1	..	..
			Somerset ..	.. ..	..	Wincanton ..	1
			Suffolk, East ..	Ipswich ..	1	..	..
Nov. 7 "	2	2	.. ..	.. ..	..	..	..
" 14 "	2	..	Lancashire ..	Southport ..	1	..	..
			Yorks, W.R. ..	Bradford ..	1	..	..
" 21 "	1	..	Salop ..	Wellington ..	1	..	..
" 28 "	5	..	Devon ..	.. ..	..	Okehampton ..	1
			Lancashire ..	Liverpool ..	1	..	..
			Staffordshire ..	Rugeley ..	1	..	..
			" ..	Stoke-on-Trent ..	1	..	..
			Warwickshire ..	Birmingham ..	1	..	..
Dec. 5 "	..	..	.. ..	.. ..	..	..	..
" 12 "	1	..	Worcestershire ..	Oldbury ..	1	..	..
" 19 "	9	1	Bedfordshire ..	.. ..	..	Biggleswade ..	1
			Essex ..	Walthamstow ..	1	..	..
			Lancashire ..	Wigan ..	1	..	..
			Sussex, East ..	Seaford ..	2	..	..
			Wilts ..	Salisbury ..	1	..	..
			" ..	Wilton ..	1	..	..
			Yorks, E.R. ..	Kingston-on-Hull ..	1	..	..
" 26 "	9	1	Gloucestershire ..	Bristol ..	1	..	..
			Surrey ..	.. ..	..	Hambledon ..	3
			Wilts ..	Salisbury ..	2	..	..
			" ..	.. ..	..	Pewsey ..	1
			Glamorganshire ..	Swansea ..	1	..	..
Jan. 2, 1915	6	2	Southants ..	Winchester ..	1	..	..
			Sussex, East ..	Eastbourne ..	1	..	..
			Warwickshire ..	Birmingham ..	2	..	..

on Salisbury Plain. There had been four cases of cerebrospinal fever among the Canadian troops while in Canada and before embarkation, and three cases had occurred during the voyage; two, a soldier and a steward's clerk, on one transport, and one soldier on another. This first Canadian case on Salisbury Plain had crossed in a transport on board of which no case occurred during the voyage. This case was followed by three others among the Canadians on the Plain as follows :—

Date of onset			Camp
October 27, 1914	..	..	West Down South.
" 30 "	..	..	" " "
November 4, 1914	..	..	" " North.

The disease next appeared among the British troops on the Plain, a private in the Royal Flying Corps stationed at Netheravon being attacked on November 13.

In the week ending November 21 two additional Canadians were attacked, one at West Down South and one at Bustard Camp. A case was notified in the same week from Galashiels in the Scottish Command, the patient being billeted in the Town Hall of that town. There appeared to be no connection between this Scottish case and the cases occurring in the South of England. A fourth case in this week was a soldier admitted to hospital at Devonport on November 21. One of the Canadian soldiers who had been attacked on the voyage had been removed to hospital at Devonport on October 15, and he died on January 6, but there is no evidence to show that he had come into contact with this Devonport case.

In the week ending November 28 one Canadian was attacked in West Down South Camp, and an English soldier in Perham Down Camp, Salisbury Plain. In this week, too, the first case was reported from the Aldershot Command. This case occurred at Bullswater Camp, which is a few miles from Aldershot Camp proper, and near Pirbright.

In the week ending December 5 the first case in the Irish Command occurred. The patient, a driver in the R.F.A., enlisted at Northampton on September 1, went to Woolwich on September 7, arrived at Kildare on September 18, where he remained until his attack on November 30.

Also in this week a Canadian soldier, who had left Salisbury Plain on December 1 or 2, was attacked while on leave in Aberdeen on December 2, and he died there on December 5.

During the week ending December 12 two cases occurred in English troops at Salisbury Plain, one at Tidworth and one at Bulford; and one case in the Eastern Command at Shorncliffe.

560 *Notes on the Prevalence of Cerebrospinal Fever*

In the week ending December 19 the following cases occurred: three Canadians on Salisbury Plain; one case at Devonport (North Raglan Barracks); and three in the Aldershot Command, viz., one each at Lille Barracks, Blackdown Camp, and Bramshott Camp; and two cases in the Eastern Command, viz., one at Sandling (Shorncliffe), and one at Woolwich; and one in the Central Force at St. Osyth in Essex.

In the week ending December 26 there were attacked eight Canadians on Salisbury Plain, one Canadian on leave at Wrexham, two soldiers at Bulford, and one at Aldershot (Tournay Barracks), and two soldiers at Shorncliffe.

In the week ending January 2, 1915, there were attacked three Canadians on Salisbury Plain, one soldier at Aldershot (Tournay Barracks), and a case occurred among the garrison of the Tower of London.

Thus the year 1915 opened with the cerebrospinal fever among troops widespread as regards area, and though it was present in no great amount there was prospect of a considerable increase.

As to how far the prevalence was fostered by climatic conditions, or by the overcrowding of troops in barracks, huts, and billets, will not be dealt with in this paper.

The rise and the decline of this cerebrospinal prevalence can be gathered from the figures in the following table, in which week by week the total number of cases notified in the civil population in England and Wales are given side by side with the cases occurring among troops. These latter are also shown under the commands.

The figures of the table are not to be taken as absolute. Among the civil population there may be duplicate notification of some cases, and as regards others the diagnosis may have been withdrawn after notification on further consideration. The military figures are also liable to subsequent correction from similar causes, and because all cases have not been reported directly they occurred for reasons which need not be considered here; they include, too, a few cases which have come "convalescent" from "overseas."

ADMINISTRATIVE MEASURES.

Major Mervyn Gordon, M.D.Oxon., Assistant Pathologist of St. Bartholomew's Hospital, who has done special work in regard to the bacteriology of cerebrospinal fever, was appointed consulting bacteriologist, and a central laboratory for cerebrospinal fever investigation was established and duly staffed at the Royal Army

TABLE SHOWING WEEK BY WEEK, FROM THE WEEK ENDING JANUARY 9 TO THE WEEK ENDING JULY 31, 1915, THE NUMBER OF CASES OF CEREBROSPINAL FEVER NOTIFIED IN THE CIVIL POPULATION OF ENGLAND AND WALES, TOGETHER WITH THE TOTAL NUMBER OF CASES NOTIFIED AMONG "TROOPS," AND THE NUMBER OF CASES OCCURRING IN EACH COMMAND.

Week ending, 1915	Total cases notified in the civil population, England and Wales	Total cases notified among "troops,"	Aldershot	Eastern	Irish	London	Northern	Scottish	Southern ¹	Western	Central Force
January 9	12	8	..	1	..	..	..	..	7	..	..
" 16	23	11	..	3	..	..	1	..	7	..	..
" 23	18	19	..	6	..	7	..	..	2	1	..
" 30	32	38	5	8	3	2	..	..	12	..	3
February 6	51	49	3	21	4	7	..	..	10	2	12
" 13	59	75	21	17	..	8	..	2	15	..	10
" 20	96	77	8	27	4	1	1	5	21	..	9
" 27	120	78	11	18	4	7	6	4	19	..	6
March 6	138	82	26	21	4	..	1	1	22	1	9
" 13	147	87	27	14	4	9	8	5	14	2	9
" 20	129	86	21	15	3	7	4	1	23	3	8
" 27	144	46	9	11	4	3	4	1	13	..	1
April 3	113	45	7	13	3	2	2	2	10	3	3
" 10	133	44	7	10	4	3	2	1	14	1	2
" 17	164	46	5	10	4	1	1	1	17	2	5
" 24	118	40	6	10	4	2	2	2	6	1	7
May 1	116	29	5	5	2	1	2	4	8	1	1
" 8	109	25	4	..	1	2	2	1	15	..	..
" 15	89	26	3	8	..	1	2	1	..	4	1
" 22	78	26	6	1	..	1	1	..	7	1	1
" 29	59	40	8	8	1	1	6	..	10	1	1
June 5	56	20	5	4	..	1	4	4	10	3	1
" 12	50	21	2	5	..	2	..	4	4	1	..
" 19	39	16	3	3	..	1	3	2	5	3	..
" 26	38	21	6	1	1	..	1	..	10	1	1
July 3	40	10	3	..	1	1	2	..	7	..	..
" 10	52	9	2	..	1	2	1	..	4	..	..
" 17	20	5	..	1	1	2	..	..	3	1	..
" 24	34	5	1	..	..	..	1	..	2	..	1
" 31	23	9	3	2	..	..	2	..	1	..	1
Total ..	2,290	1,088	209	244	51	73	52	43	300	32	84

¹ Cases occurring among the Canadian troops on Salisbury Plain are included in the Southern Command.

Medical College, Millbank, under his direction. In this laboratory the media for cultivating the meningococcus were prepared and distributed to the different bacteriological laboratories in the several commands. To this laboratory selected bacteriologists who had previously no special knowledge or experience of cerebrospinal fever were sent for instruction, the staff there being always prepared to discuss any technical point arising and to assist other official workers. Laboratory assistants too received special training here.

Special bacteriological laboratories were arranged for in the several commands, some forty in England and Wales and others in Scotland and Ireland. So far as was found practicable existing laboratories were utilized and subsidized. The bacteriological laboratories of the Universities, of certain counties and municipal bacteriological laboratories of particular large towns afforded special facilities, as they already possessed the necessary accommodation and the trained staff; in a few instances private laboratories were also made use of. In most of these cases the professional staffs received grants in aid for their special work from the Medical Research Committee of the National Health Insurance Commissioners. Where civil laboratories were not available, either the bacteriological laboratories of certain military hospitals were adapted for the work or a military laboratory was newly established and a military staff installed. Some little difficulty was experienced in Scotland and Ireland in arranging for laboratories to be available for the troops, as in these countries small bodies of troops were stationed in places not well supplied by railways and it was not always an easy matter to get the material taken from the patients promptly delivered for examination to the laboratories.

Medical officers in charge of troops were required to notify by telegram each case as it occurred to the War Office in addition to notifying the case to the D.D.M.S. of their Command.

The bacteriologist of the district in which the case occurred then dealt with the case and with the contacts, or his assistant or other person accustomed to swab patients acted for him in the field. At each bacteriological station an officer was appointed to keep the records of the case and to make inquiries concerning their environment.

In order to meet emergencies a motor bacteriological laboratory was specially fitted up and placed in charge of one of the Millbank Laboratory staff, Captain Hine, R.A.M.C., who had a laboratory assistant specially appointed for duty solely with this special

laboratory. This travelling laboratory has proved most useful; it was dispatched to outbreaks where the local staff was inadequate to deal with the number of contacts, and for duty in places where no bacteriological laboratory was easy of access. It was available also to afford assistance of a confirmatory character on occasion. On such duties it made visits to Berkshire, Devonshire, Hampshire, Sussex, etc., and it was found of special value within London and in its immediate neighbourhood.

As soon as it became known that cerebrospinal fever was present among the Canadian troops, a special bacteriological laboratory was established on Salisbury Plain by Surgeon-General Carleton Jones to deal solely with the malady occurring among the Canadian troops. It was staffed by Canadian medical officers and placed under the direction of Dr. Arkwright, of the Lister Institute. The operations of this laboratory were continued until such time as the Canadian Contingent went "overseas," when the laboratory accompanied the Canadian troops.

Memoranda¹ A, On the Procedure to be Adopted on the Occurrence of a Case of Cerebrospinal Fever, and B, Memorandum on Cerebrospinal Fever in Military Camps, were drawn up and sent to each command.

When in due course detailed reports have been received from each command, a reasoned opinion based on the experience of the whole kingdom can be formed, and such alterations and readjustments as may be indicated will then be made.

Naturally, as might be anticipated under the circumstances in which the administrative measures were brought into being, minor difficulties were met with, but no serious obstacle has been encountered. Judging from the information at present available, the administrative measures have worked smoothly and efficiently.

It is not my intention to enter into purely bacteriological matters: these will be dealt with later on in the reports from the central and the several local laboratories.

The administrative procedures adopted have been based on the assumption that the disease is in the main spread from person to person, and that persons otherwise in good health may harbour the infection in their nasopharynx and may be the means of spreading the disease to others in its meningeal form. Many instances where this has apparently happened have come under review.

¹ These memoranda are reproduced as Appendices A and B at the end of this paper.

Observers in various parts of the world have come to a conclusion which can be adopted for practical administration, that the average period of time during which a person may carry the active infection in his nasopharynx is twenty-one days. There are instances on record in which the time has been shorter and instances where it has been longer; "chronic carriers," for instance, are not unknown. Theoretically this would seem to imply that in the majority of cases persons who have been in contact with patients exhibiting meningeal symptoms should be kept under surveillance and segregated from others for a period of three weeks. But given reasonable opportunity for due bacteriological examination of swabs taken from the nasopharynx of these contact cases, a fairly trustworthy result should be available in four or five days, and contacts giving persistently negative results may be discharged to duty. From the point of view of efficiency and the training of the soldier this last is an important consideration. It represents some seventeen days of saved service in each contact thus found to be "negative." As in certain instances the number of contacts was considerable, in a particular case three hundred and fifty-two, and as the number of "positive" carriers found has proved no more than fourteen, it will be realized that by procedure on this basis the saving to the Army of efficient service has been of material value.

A.

APPENDIX.

CEREBROSPINAL FEVER.

PROCEDURE TO BE ADOPTED ON THE OCCURRENCE OF A CASE OF CEREBROSPINAL FEVER.

- (1) *Patient*.—(a) Examination of the cerebrospinal fluid, obtained by lumbar puncture, should be made to verify the diagnosis by the identification of the diplococcus.
- (b) The patient should be effectively isolated.
- (c) Disinfection of the patient's clothing, feeding utensils, and the room he occupied should be carried out in accordance with regulations.
- (d) Anti-meningococcic serum can be obtained direct from Major Harvey, Royal Army Medical Corps College, Millbank. If required, this should be wired for.
- (2) *Contacts*.—(a) A bacteriological examination of swabs from the nasopharynx of each contact should be made, care being taken to avoid

swabbing of the pharynx and mouth. Segregation of all contacts will continue until these swabs have proved negative. Contacts should use separate feeding and drinking utensils, each man keeping his own. During this isolation these men, if physically fit, can be drilled in the open air.

(b) Nasal sprays should be used for contacts whose swabs have been proved positive, and for any contact cases whose throats are not in a healthy condition. These sprays should be indented for by telegram from the War Office, and a covering indent submitted through the usual channels. A disinfecting solution, such as potassium permanganate, 1 in 1,000, should be used. Nasal spraying should be carried out under medical supervision.

(3) *Bacteriological.*—(a) It is necessary that an experienced bacteriologist should have charge of this investigation, and every means will be placed at his disposal. In the absence of an experienced bacteriologist, the D.D.M.S. of the Command should be notified by telegram. If required, additional equipment for the laboratory may be indented for direct to the War Office.

(b) Any arrangements made for bacteriological examination, including the name of the bacteriologist and the laboratory concerned, will be reported by telegram to the D.D.M.S. of the Command and to Colonel Horrocks, K.H.S., at the War Office at the time when the first case occurring in any station is notified. Where cases have already occurred the same information should be furnished if it has not already been supplied.

(c) Throat swabbing should be done under the superintendence of the bacteriologist.

(4) *Investigation of Cases.*—(a) One medical officer should be responsible in each station for record keeping and investigation of cases and contacts.

(5) *Prevention.*—(a) Special attention should be directed to cases of sore throat, headaches, etc., suggesting influenza. Barrack rooms, mess rooms, canteens, billets, etc., occupied by the unit concerned should be examined to rectify any overcrowding and to secure ample ventilation. It is most important that cleanliness of the soldier's personal apparel, of his bedding, and of the floors of hutments, etc., should be secured.

(6) *Co-operation between Military and Civil Authorities.*—Should the case occur where the patient is a soldier living in billets, the medical officer in charge of troops should, in addition to notifying the case to the medical officer of health of the district, confer with him in regard to the civilian contacts in the house. If the civil sanitary authority has no means available for the immediate examination of swabs taken from these civilian contacts, the swabs should be examined in the military laboratory.

B.

APPENDIX.

MEMORANDUM ON CEREBROSPINAL FEVER IN
MILITARY CAMPS.

DIAGNOSIS.

(1) *Clinical*.—This disease is characterized by the following symptoms and signs: intense headache, pain and stiffness in the muscles, especially of the neck, retraction of the head, fever, vomiting, delirium and, subsequently, coma. A positive Kernig, strabismus, and photophobia are common early manifestations. A purpuric eruption occurs in some cases. It should be remembered that the disease is protean in character, and that atypical cases may occur in which the usual symptoms are suppressed; for instance, a condition of sore throat may suddenly be succeeded by coma and death.

(2) *Bacteriological*.—The causative micro-organism is the *Diplococcus intracellularis* of Weichselbaum, which has primary residence in the nasopharynx.

In men definitely attacked this micro-organism is best isolated from the cerebrospinal fluid which is found to be under increased tension, and frequently turbid from polymorphonuclear leucocytes many of which contain the diplococcus, as can be ascertained by a study of stained films of the centrifugized deposit.

It is necessary, therefore, to examine the cerebrospinal fluid in all cases of meningitis in order to establish the diagnosis.

TREATMENT.

Men definitely attacked must be regarded as infectious, and removed to a special isolation hospital.

Anti-meningococcal serum should be injected intraspinally after removal of an equal amount of cerebrospinal fluid. The serum should be warmed to the body temperature, at least twenty cubic centimetres injected, and the foot of the bed should be raised after the injection. The dose should be repeated daily. Intercurrent conditions will be treated as they arise, special care being taken of the eyes.

PREVENTION.

The clothing, bedding, and quarters of men definitely attacked are to be disinfected, and, as far as is practicable, all contacts are to be segregated. Pending the result of the bacteriological examination of their nasopharynx, these men should be treated with antiseptic sprays and gargles twice a day.¹ The men who are reported to be carriers should be transferred to other quarters and isolated until two successive swabs taken from the nasopharynx are returned as negative; the

¹ Potassium permanganate 1 in 1,000 in a solution of 1·5 per cent. sodium sulphate is a suitable gargle, and for a spray the following: iodine 4 gr., menthol 8 gr., parolein to 1 oz.

remainder in whom the results are negative may be allowed to return to duty provided the throat is normal.

TECHNIQUE OF PASSING THE NASOPHARYNGEAL SWABS.

Two matters are of prime importance in this connexion :—

(1) Owing to the similarity of the meningococcus to several less harmful micro-organisms normally present in the mouth, it is important that the swab should be as free as possible of contamination with saliva.

(2) As the meningococcus readily dies on the swab, it is desirable to make the cultures as quickly as possible.

With a view to avoidance of contamination by saliva, a special covered swab such as that introduced by West is suitable. The man is seated facing the light. His mouth is opened as wide as possible, and the tongue depressed with a spatula. During phonation, the covering tube containing the swab is passed behind the soft palate, and the swab extruded so as to come in contact with the nasopharynx. The swab is then drawn back into the covering tube and the instrument removed.

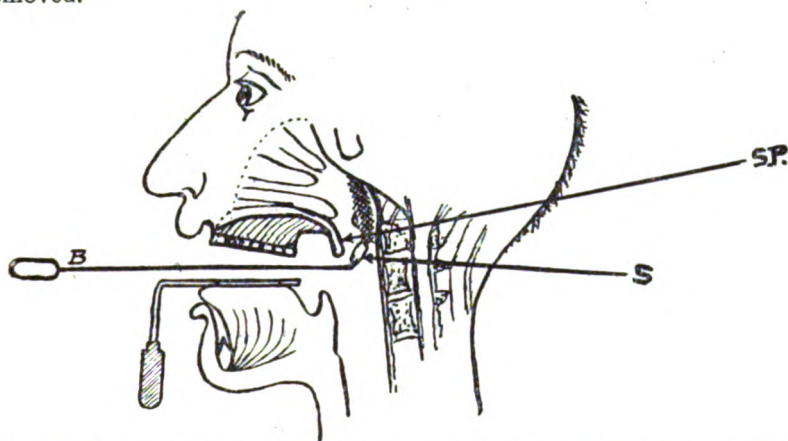


Diagram after Netter and Debré showing the method of swabbing the nasopharynx of contacts for the meningococcus.

SP. = soft palate; S = swab; B = handle of swab.

MODE OF DEALING WITH THE SWAB.

The requirement in this case is to obtain growth of the bacteria in separate colonies. Unless great care is taken, the medium is apt to be too heavily inoculated.

If Petri dishes are available, they provide the best means of attaining this object. Such Petri dishes or "plates" already poured should be brought to the spot and inoculated at once. In this case the plate should be kept inverted; it is advisable to lightly touch one portion only of the medium with the swab, and subsequently to rub over this spot with

a sterile glass rod. If possible, the rod should be rubbed over a second plate in addition.

It may not be possible for the bacteriologist to be present at the time when the swab is taken. In that case the swabbing should be performed by a specially trained attendant who should inoculate the plates at once. If this cannot be done the swabs must be placed in a sterile close-fitting metal box and delivered at the laboratory within two hours, where the plating will be carried out.

NOTE WITH REGARD TO THE BACTERIOLOGICAL IDENTIFICATION OF THE MENINGOCOCCUS.

(1) *Cerebrospinal Fluid*.—The bacteriological diagnosis can usually be made by the presence of a Gram-negative diplococcus in stained films of the centrifugized deposit.

For isolation of the meningococcus the necessary media may be obtained from the Central C.S.M. Laboratory, Royal Army Medical College, Millbank: telegraphic address, "Jaspag, London"; telephone, Victoria, 2877.

(2) *Secretion from the Nasopharynx*.—The stages of the investigation are as follows:—

(a) Examination of separate colonies on the cultures. Colonies of the meningococcus appear at 37° C. in twenty-four to forty-eight hours. They are larger than colonies of the accompanying pneumococci and streptococci. They are clear, smooth and transparent, have a firm outline, and are very characteristic. A portion of one of these colonies taken up on a platinum needle is found to emulsify readily in a drop of water on a glass slide.

(b) Gram's stain. A film made from one of these colonies shows Gram-negative diplococci.

(3) Subcultures are made, and placed at 37° C. and at 23° C. respectively.

The meningococcus does not grow at 23° C., whereas the vast majority of the Gram-negative cocci of normal saliva grow readily at this temperature.

In view of the sharp distinction which this test provides, it will be sufficient for practical purposes to regard the suspicious cocci that have passed it as meningococci.

Confirmatory tests should be employed for greater accuracy as follows:—

(4) *Fermentation Tests*.—The meningococcus ferments glucose with the production of an acid reaction, but fails to change saccharose. These tests are applied by making subcultures at 37° C. in media tinted with litmus and containing the above sugars respectively.

(5) *Agglutination*.—The meningococcus shows positive agglutination when brought in contact with anti-meningococcus serum.

War Office, S.W., February 25, 1915.

NOTES OF THE OCCURRENCE OF PARASITES PRESUMABLY RARE IN MAN.

BY TEMPORARY LIEUTENANT-COLONEL R. T. LEIPER, D.Sc., M.B.

Royal Army Medical Corps.

University Reader in Helminthology, London School of Tropical Medicine.

THE parasitic worms are generally so large and obvious that it would seem very unlikely that forms other than unnatural infections could have remained practically unrecognized. Yet from material that has reached me during the last two or three years it is evident that this is actually the case. Three species of nematodes have now occurred in several small consignments, and one must conclude that they are common parasites in certain localities. To previously published cases,¹ I make the following additions, in the hope that attention may be attracted to the incidence of these relatively unfamiliar forms.

Physaloptera mordens Leiper.

This parasite was first described from material received, during a visit to Uganda, from Dr. Grey of the Sleeping Sickness Commission. Further examples have been contributed by Dr. Turner from his post-mortems of negroes dying in the Transvaal. Dr. Macfarlane has just forwarded to me several specimens collected by him from two cases during a recent tour in Portuguese East Africa. The new specimens are notable for their size, one female attaining to a length of two and a half inches. These worms live in the stomach, often in association with *Ascaris lumbricoides*, which they closely resemble. They are readily recognized with a hand lens, for they possess a cuff-like cuticular expansion at the anterior end which almost invariably obscures the lips. When these are visible only two are found, a feature which at once distinguishes the genus *Physaloptera* from the genus *Ascaris*. Moreover, the skin over the whole body is smooth, while in *Ascaris* it is characteristically transversely striated. In the male the cuticle is expanded laterally on either side of the tail, and into these expansions four elongated papillæ protrude on either side. There are other, sessile, papillæ, but these are difficult to find with

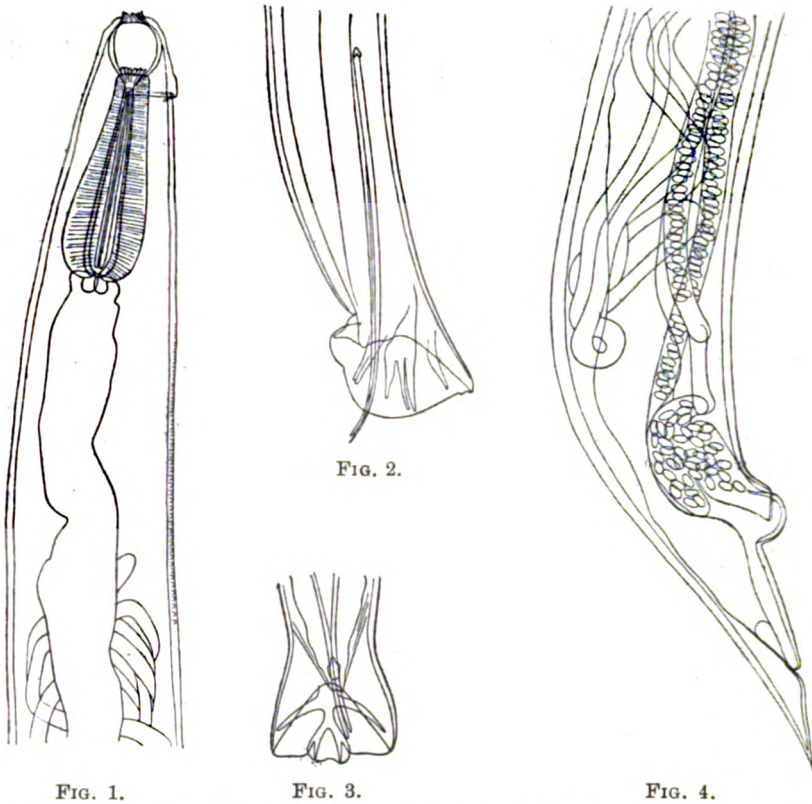
¹ *Journal of the London School of Tropical Medicine*, vol. i, No. 1, pp. 16 to 19 (1911).

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a hand lens. The eggs have a shell of thick clear cuticle with a smooth surface. The life-history is unknown, but presumably similar to that of the *Ascaridæ*.

Triodontophorus deminutus Railliet and Henry.

The original description of this species was based upon two specimens which had lain unidentified for forty years in the Paris Natural History Museum. In 1908 an account of this species was



Triodontophorus deminutus. Fig. 1.—Anterior end. Fig. 2.—Posterior end of male, lateral view. Fig. 3.—Posterior end of male, dorsal view. Fig. 4.—Posterior end of female. (Drawn by Wm. McDonald).

published by me in a note on "The Occurrence of a Rare Sclerosome of Man in Nyassaland," together with a clinical report by Dr. Turner, who had supplied the material. In 1911 I recorded further cases from Dr. Turner, from Dr. Stannus in Nyassaland,

and from the Medical Officer of Lorenzo Marques. Since then I have received in 1912 specimens from two cases under Dr. Stannus in Nyassaland, and during the current year a quantity of material from three cases observed by Dr. Macfarlane in Portuguese East Africa.

The parasites are apt to be mistaken for ankylostomes. They often occur in the same cases, and their eggs also are very similar. *Triodontophorus* has, however, a different habitat from the *Ankylostoma*. The former lives attached to the wall of the great intestine, the latter occurs only in the small intestine. Structurally the two parasites differ very considerably. The oral capsule in both has a chitinous wall, but in *Triodontophorus* the orifice is quite terminal, and is guarded by a ring of stout bristles. In *Ankylostoma* the mouth capsule is always bent dorsally, and the mouth capsule is guarded by bilaterally placed paired teeth.

Ancylostoma ceylanicum Looss.

The credit of detecting this worm as a common parasite of cats and dogs, and as an occasional parasite in man, is due to Major Clayton Lane, I.M.S., the first and hitherto only records being made by him in 1913. Workers in China had reported the occurrence of the human ankylostome as an occasional parasite of dogs in Shanghai. During a visit in 1914 I made a detailed examination of a large number of dogs in Shanghai and at Hankow, in the hope of finding *Ancylostoma ceylanicum*. Ankylostome infection of dogs was very common, but the species was invariably *A. caninum*. In a recent letter Dr. Kerr informs me that he has found what appeared to be *A. ceylanicum* in dogs and cats, and in ten to twelve per cent. of the cases examined by him in the prison at Chiengmai, Siam, usually with only one or two worms in each case. The worms from two of these cases were received for identification, and are undoubted examples of this species.

As Major Clayton Lane has already pointed out, the prevalence of a canine ankylostome in man may eventually necessitate a slight readjustment of our views on prophylaxis.

In the latest issue (July 31, 1915) of the *Annals of Tropical Medicine and Parasitology*, Professor Warrington Yorke and Dr. Blacklock publish a brief interim Report on "Ankylostomiasis in dogs in Sierra Leone." They conclude from an examination of seven dogs at Freetown that ankylostome infection appears to be universal in dogs in Freetown and that one of the two species found is the *Ancylostoma ceylanicum*. They add, "We have had no opportunity

of determining whether *Ancylostoma ceylanicum* occurs in human beings in Sierra Leone." "The importance of ascertaining whether this species occurs in man is obvious. If *Ancylostoma ceylanicum* is found in human beings in Freetown, the dog reservoir of the infection is a factor which must be borne in mind when prophylactic measures are under consideration."

The details given in this paper lead me to doubt the accuracy of the diagnosis of *A. ceylanicum*. The authors compare their presumed *A. ceylanicum* with *A. caninum* and illustrate the main points of contrast with figures reproduced here.

With reference to the dorsal lobe of the bursa, Yorke and Blacklock write: "In the dorsal lobe is the posterior ray, which exhibits slight differences in the two species. In both it is bifurcated in its terminal third and each of the branches is at its extremity tridigitate. It is in the character of these terminal digitations that the slight difference is found. (Figs. 5 and 6, after Yorke and Blacklock.) In both species the two inner digitations are small, being separated by a mere notch."

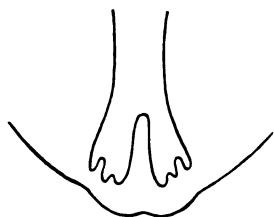


FIG. 5.



FIG. 6.



FIG. 7.

Fig. 5.—Dorsal ray of *A. caninum*. Fig. 6.—Dorsal ray of *A. ceylanicum* (?), from Sierra Leone. Fig. 7.—Dorsal ray of *A. ceylanicum* from India.

I append a drawing (fig. 7) from an Indian specimen of *A. ceylanicum*; it will be seen that the dorsal ray has a pair of digitations only on each of its two branches. As this division is of specific importance and occurs in all specimens, it seems unlikely that the West African dog ankylostome is the same species as that recorded above. The drawings of the mouth capsule given by Yorke and Blacklock certainly show a single pair of large chitinous teeth as in *A. ceylanicum*, but the outline is scarcely correct. One is inclined to think that these authors have been dealing with *Uncinaria stenocephala* Railliet, a similar ankylostome often found in association with *A. caninum*.

As regards synonymy a recent article by Gomes de Faria

contributes further anatomical details which tend to show that *A. braziliense* and *A. ceylanicum* are distinct species.

Some attention has already been devoted to ankylostomiasis in Sierra Leone. Major F. Smith in a paper in the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS for 1905 says: "I have not yet found in Sierra Leone a dog free from ankylostomes" but he does not indicate that man and the dog in those regions have a species in common.

Euparyphium malayanum Leiper.

This species was described briefly by me in 1912 from poorly preserved material forwarded by two medical officers in the Malay States, but derived, as it afterwards appeared, from the same post-mortem. Later the material was described more fully by Professor Odhner of Christiania, who has a special claim to authority in this group.

Dr. Kerr has now sent a single specimen from a case at Chiengmai with the following comment: "This worm was obtained as the result of an anthelmintic and is the only one of the kind I have met with."

A third case would appear to have come recently under the notice of Dr. E. Smythe, of Suffry, Assam. In the April issue of the *Indian Journal of Medical Research* for 1915, Major Clayton Lane describes the specimens under the new and distinctive name of "*Artyfechinostomum sufrartyfex*." The flukes had been vomited and passed by a girl of seven. Although the new species is placed in a different genus and subfamily of the Echinostomidæ, the great similarity in the descriptions and figures leaves room for doubt whether the species reported on by Lane is not the same as that previously described by Odhner and myself.

Opisthorchis viverrini Poirier 1886.

In Dr. Kerr's consignment of parasites obtained from prisoners in the Chiengmai jail was a tube containing three flukes regarding which the following notes were supplied:—

"*Opisthorchis felineus*? Ova found in about fifteen per cent. of the fæces examined. The worms were twice obtained post mortem, in one case a single one from the intestine, in another twelve worms from the gall-bladder and large bile-ducts. The ova have a small projection at the distal end to the cap. The worms also differ from the figures I have of *Opisthorchis felineus* in having a much longer part of the intestine unbranched, they also seem smaller.

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I was present at a post-mortem by Dr. Mason where thousands of these worms were removed from the liver."

These worms resemble *Opisthorchis felineus* but differ in the following points of specific importance: The skin is covered with

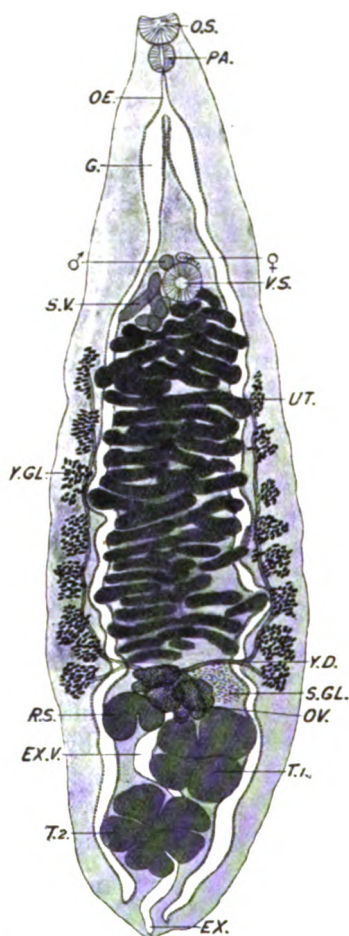


FIG. 8.—*Opisthorchis viverrini* Poirier in man.

minute acicular spinelets; the ovary is multilobulate; the branches of the gut proceed almost to the extreme posterior end of the body. The ovary and testes fill the last fourth of the body between the gut branches.

The length of the œsophagus is from two to three times that of

the pharynx, varying with the degree of contraction of the specimens. The ventral sucker is of about equal size with the oral, if anything occasionally slightly larger (fig. 8).

In 1907 Verdun and Bruyant recorded the occurrence of *Opisthorchis felineus* in a patient from Hanoi. The skin is stated to be smooth and the ovary round or arcuate.

In a paper entitled "Observations on certain Helminths of Man," published in 1913, I made the following remarks: "Some years ago Dr. Maxwell forwarded to me from Formosa a macerated specimen from the stool of a cat, which shows short spines on the cuticle, but unfortunately the testes had been digested and it was impossible to say more than that the worm was either a *Clonorchis* or an *Opisthorchis*. Looss has recently drawn attention to a record by Ijima, in 1886, of the occurrence in the liver of a cat in Japan of a distome, with spines, smaller than *C. endemicus*." There seems a probability that the parasite now under discussion is the same species as that referred to in the above quotation.

The most nearly related forms in the genus *Opisthorchis* are *O. felineus*, *O. pseudofelineus*, *O. noverca* and *O. viverrini*. Identity with the first named can be excluded by the presence of spines and the occurrence of a lobulated ovary; with the second and third species by the lobulation of the ovary and the absence of a backward extension of the yolk glands beyond the receptaculum seminis to the anterior testis. There remains *Opisthorchis viverrini*. The description of *O. viverrini* by Poirier omits to give details regarding the skin, but in other respects the account tallies with our own findings. Until *O. viverrini* is examined more fully I do not think one would be justified in separating these forms. I therefore make a provisional diagnosis of *O. viverrini*, a parasite found in the Indian civet cat, but not recorded heretofore from man. Infection is probably acquired from the consumption of uncooked or partially cooked freshwater fish.

Clinical and other Notes.

CASE OF SUSPECTED LEPROSY AT THE PRISONERS OF WAR CAMP, HANDFORTH.

By PROFESSOR SHERIDAN DELÉPINE, M.B., C.M., B.Sc.

IN accordance with a request which I received on July 21, 1915, from Major H. A. Berryman (for D.D.M.S.), I visited on the afternoon of the same day the Prisoners of War Camp, Handforth, where I met the medical officer-in-charge, and saw the case.



German, F., No. 6529, aged 53, married thirteen years, no children, three years in the German army, left Germany when aged 21, ship's fireman, has been in India, China, Mediterranean and Black Seas, and

has often crossed to America; has seldom remained long on shore, longest stay two or three weeks when waiting for cargo; has not lived abroad for any considerable period.

He did not notice anything till about a year ago, when he burnt his foot on a piece of cinder. The foot swelled considerably and the burn



took a long time to heal. He was in hospital in Constantinople for six weeks on that account. He returned to sea, and was again admitted to some hospital on the Black Sea coast on account of his foot. He returned afterwards to Sunderland, which was his home address. He did not notice himself any change in his face until about two months ago. About four months ago his wife noticed the sinking of his eyes and some loss of hair. He had not noticed anything wrong with his hands. He had felt easily tired and heavy in the legs.

Present State.—The face has a typical leonine appearance. The parts chiefly affected are the superciliary region, the nose, the chin, and the ears. The hair of the eyebrows has almost entirely disappeared. The hair of the upper lip is thin and coarse.

The anterior fourth of the nasal septum shows no obvious evidence of nodulation, ulceration, or suppuration.

The whole of the mucous membrane of the hard and soft palate is affected, irregularly thickened, showing numerous irregular areas, reddish in the centre and with a pale raised border. These patches are irregularly rounded, measuring from one-twelfth to a quarter of an inch in diameter. Many of them are confluent. The soft palate is distinctly thickened. The uvula is not materially altered. The part of the pharynx which is visible is in the same condition as the palate. The voice, which is considerably reduced and roughened, indicates that the larynx is probably in the same state as the mucous membrane of the palate. The patient says he has been losing voice for six or seven weeks, but that he has no cough or expectoration.

Arms.—Both arms are very nearly in the same state. On the right arm there is at the elbow a large lobulated tubercle. On the dorsal aspect of the arm there are a number of small raised patches. In the upper third of the forearm there are two distinct nodules about a quarter of an inch in diameter not adherent to the skin. Over the back of the lower end of the ulna there is a marked flat swelling, and in that region the skin feels very much thickened and is stiff.

In addition to these lesions the skin of the back of the forearm shows patches of purplish and brownish discoloration and ill-defined swellings. There is also, two or three inches above the wrist, a sharply defined patch of leucoderma. The skin of the back of the hand is very much in the same state as that of the back of the forearm, but the lesions are more generalized and diffused. There is a marked swelling of the skin over the lower end of the metacarpal bones. The fingers are swollen and purplish. The skin is smooth. There are no obvious necrotic lesions, but there is marked reduced sensitiveness of the skin.

Legs.—The legs are more severely affected than the arms. The changes in the right leg are more marked than those in the left leg. Under the ball of the right big toe there is a scar indicating the place where the patient injured his foot.

Below the middle of each leg the skin of the leg and foot has a general purplish coppery colour. It is very dry and smooth, as if stretched owing to subjacent swelling of the tissues. This swelling appears to be entirely due to the presence of a large mass of confluent nodules which can be felt more or less distinctly by passing the hand over the skin. At the line of demarcation between the comparatively normal skin of the upper half of the leg and the lower infiltrated area, there is a zone where the skin has a scaly appearance.

Bacteriological Examination.—I proceeded by means of swabs to take specimens of products.

- (1) From the right and left aspect of the septum nasi.
- (2) From the mucous membrane covering the hard palate.
- (3) From the mucous membrane covering the soft palate.
- (4) From the mucous membrane of the back of the pharynx.
- (5) By means of a slight incision I obtained some of the lymph from the nodule over the lower end of the ulna in the right arm.
- (6) In the same way I obtained some small shred of tissue from a tubercle at the back of the left wrist.

Microscopical examination of these various products revealed the presence of a large number of bacilli of leprosy. The case is obviously one of leprosy of the nodular type. Some of the lesions are of the nature generally associated with anæsthetic leprosy.

Recommendations.—Having been asked to offer suggestions regarding the disposal of the case, I beg to say that such a case should undoubtedly be isolated, more especially in consideration of the feelings of the other persons interned in the camp. As isolation would probably be a matter of great difficulty at a camp, I would suggest that, if there is no objection from the military point of view to such a case being transferred to a hospital, inquiry should be made either at the Southern Hospital in Liverpool or at the Seamen's Hospital at Greenwich, to find whether these institutions would be in a position to receive such a case.

The question of special treatment would not arise till the patient was received in such a hospital. With regard to general treatment, I, of course, need not say anything.

A SHORT NOTE ON THE WORK DONE IN THE MILITARY FAMILIES HOSPITAL, MALTA, DURING THE PERIOD FROM JANUARY, 1909, TO AUGUST, 1914.

BY LIEUTENANT-COLONEL A. E. WELD.

Royal Army Medical Corps.

General Cases.—Women, 562 cases, with 7 deaths; children, 648 cases, with 84 deaths.

Parturition Cases.—Number of cases 597, with 2 deaths.¹ Males, 288; females, 255; stillbirths, 10.

Out-patients.—Number of cases, 10,171, of which 1,090 were gynaecological cases.

Of the 1,210 "General cases" the mortality was due to the following conditions :—

¹ Eclampsia and pneumonia.

Disease	WOMEN		CHILDREN	
	Cases	Died	Cases	Died
Enteric fever	14	1	22	0
Enteritis	0	0	0	0
Gastro-enteritis	6	1	134	39
Ilio-colitis	0	0	0	0
Kala-azar	0	0	17	4
Pneumonia	5	3	13	3
Broncho-pneumonia	0	0	20	7
Meningitis	0	0	7	7
Convulsions	0	0	5	2
Eclampsia	1	1	0	0
Obstructive jaundice	0	0	2	2
Intussusception	0	0	2	2
Peritonitis	0	0	2	1
Phagedena	0	0	1	1
Debility	21	0	17	4
Scurvy	0	0	1	1
V. D. H.	5	1	1	0
Variola	0	0	1	1
Burns	0	0	7	1
Fractured skull	0	0	2	1
Premature births	0	0	18	8
	52	7	272	84

TABLE OF PARTURITION CASES.

Presentation :—

Vertex : L.O.A.	304 cases.	
R.O.A.	208 "	
R.O.P.	12 "	(Face to pubes 7 cases.)
L.O.P.	6 "	
Face : L.M.P.	1 "	
Brow	1 "	
Breech : L.S.A.	4 "	
R.S.A.	8 "	
Transverse	4 "	
B.B.A.	2 "	

550 cases.

REMARKS.

Forceps were used in fifteen cases.

Labour was induced for :—

(a) Severe accidental hæmorrhage at six months in one case, with the death of the infant; at eight months in eight cases, with the loss of one child.

(b) Contracted pelvis: at four months in one case of greatly contracted pelvis, where the mother, though given the option, refused to go to term and have Cæsarean section performed; at seven months in three cases, with no infant mortality. The parturient history of one

of these latter cases was of peculiar interest. Her first labour was terminated by craniotomy, while the second and third ended as difficult forceps cases with considerable damage of the passages. When three months advanced in her fourth pregnancy she was admitted to hospital with a large umbilical hernia, which was operated on successfully. Labour was induced at the eighth month, was normal, and the operation scar stood the test of labour.

(c) *Placenta prævia* : at seven months in one case, at term in one case.

Podalic version was performed in the four transverse presentations.

Post-partum hæmorrhage occurred in one case.

Accidental hæmorrhage occurred in one case.

Adherent placenta occurred in three cases.

Prolapse of the cord occurred in one case, but reposition was successfully carried out.

Severe albuminuria occurred in four cases, and after labour completely cleared up.

Eclampsia occurred during the puerperium in one case, which terminated fatally.

Epilepsy occurred in one case.

Six cases were twin births, all the infants surviving.

Stillbirths.—Ten infants were stillborn. Hydrocephalus one case. An abdominal cyst obstructing labour occurred in one case where the foetus at birth was found to have an imperforate anus. The history of this case was of extraordinary interest. The patient was admitted to hospital with the membranes already ruptured, and an escape of very offensive liq. amnii. Owing to the slow dilatation of the os forceps were applied after some delay, and the head delivered with great difficulty. After the birth of the shoulders all further attempts at delivery failed till, during the unavoidably powerful manipulations, the cyst burst and the child was delivered. Quantities of the most foul smelling discharge escaped with it. The child had evidently been dead for some time. The patient died ten days later of pneumonia.

Craniotomy was performed in two instances; one of these was the above-mentioned case of hydrocephalus, the other was a case of placenta prævia complicated by transverse presentation of a large foetus. Podalic version was followed by perforation and crushing of the after-coming head, as the mother's weakened condition, through loss of blood, necessitated a rapid delivery. The patient made a good recovery from this her second craniotomy.

Enteric Fever.—The fatal case among the thirty-six cases of enteric was on admission already in the third week of her illness, and suffering from hæmorrhage as a complication. The hæmorrhage had at least been aggravated by the ingestion of enormous numbers of grape stones which were passed by the bowel. All the cases were treated by the "open bowel" method, Burney Yeo's chlorine mixture at the beginning and

urotropine at the end of the attack. In one case a vaccine prepared from the patient's own infection was tried, but it appeared to make the general condition worse and to prolong the pyrexia, so this form of treatment was not repeated. None of the cases were discharged from hospital until bacteriological examination of the excreta showed a negative result.

TABLE SHOWING OPERATIONS DONE IN THE MILITARY FAMILIES HOSPITAL, MALTA.

Operation	Num-ber of cases	Suc-cessful	Died	Remarks
<i>Operations for Abscess of—</i>				
Breast	9	9	..	..
Axilla	1	1	..	..
Ilio-psoas	1	1	..	..
Ischio-rectal	1	1	..	..
Lymphatic glands	6	6	..	..
Supra-patella bursa	3	3	..	..
Whitlow	7	7	..	..
Pelvis	1	1	..	..
Various	23	23	..	..
<i>Operations on Circulatory System—</i>				
Capillary nævus	2	2	..	..
Varicose veins	2	2	..	(Done under local anæsthesia)
Phlebotomy	11	11	..	(Intravenous injection of salvarsan in kala-azar)
<i>Operations on Bones—</i>				
Removal of sequestra	1	1	..	..
Evacuation of abscess	1	1	..	(Osteomyelitis)
<i>Operations on the Skull—</i>				
Trephining	1	1	1	(Depressed fracture and cerebral compression. Died eleven days after)
<i>Operations, Dental—</i>				
Extraction of teeth	26	26	..	..
<i>Operations on Mouth and Nasopharynx—</i>				
Excision of tonsils	11	11	..	} (No anæsthetic was employed for either of these)
Removal of adenoids	34	34	..	
<i>Operations on Ear—</i>				
Acute suppurative otitis media	1	1	1	(Died of meningitis fourteen days after)
<i>Operations on Breast—</i>				
Removal of papilloma of nipple	1	1	..	..
<i>Operations on Thorax—</i>				
Empyema	1	1	..	..
<i>Operations on Abdomen—</i>				
Laparotomy	2	2	1	(1 was tubercular peritonitis, recovered; 1 for septic peritonitis, died)
<i>Hernia, radical cure—</i>				
Inguinal	12	12	..	..
Femoral	1	1	..	..
Umbilical	2	2	..	..
Ventral (through old scar)	1	1	..	..
Removal of appendix	4	4	..	..
Intussusception	2	2	2	..

OPERATIONS DONE IN THE MILITARY FAMILIES HOSPITAL, MALTA—*continued.*

Operation	Number of cases	Successful	Died	Remarks
<i>Operations on Rectum—</i>				
Hæmorrhoids	2	2	..	..
<i>Operations on Male Generative Organs—</i>				
Circumcision	105	105	..	..
Encysted hydrocele of cord ..	2	2	..	..
<i>Operations on Female Generative Organs—</i>				
Ovariectomy, double	3	3	..	..
single	5	5	..	..
Removal of Fallopian tube ..	1	1	..	..
Supravaginal hysterectomy ..	3	3	..	..
Pan-hysterectomy	1	1	..	..
Removal of fibro-myoma ..	1	1	..	..
Ventral fixation of uterus ..	7	7	..	..
<i>Operations per Vaginam—</i>				
Amputation of cervix	1	1	..	..
Repair of lacerated cervix uteri	1	1	..	..
Curetting of uterus for —				
Abortion	20	20	..	..
Dysmenorrhœa	10	10	..	..
Endometritis	12	12	..	..
Perineorrhaphy	6	6	..	..
Urethral caruncle	1	1	..	..
Removal of Bartolini's gland for cyst	2	2	..	..

Enteritis.—The medical treatment of enteritis in Malta, unless the cases are seen in the first few hours of the disease and treated vigorously, is heartbreakingly disappointing. Most of the fatal cases were moribund on admission, this being chiefly due to ignorance on the part of the parents, who failed to recognize the urgency of early medical treatment. Many lines of treatment were tried, but the one which gave the most satisfactory result may be outlined as follows. An initial large dose of oleum ricini was administered and all food was withheld for the first two days with the exception of brandy and water. Lavage of the bowel was carried out once or twice a day with, in addition, lavage of the stomach in those cases where vomiting persisted. All forms of milk were avoided for some weeks, the child meantime being fed on patent foods. Vegetable soups carefully prepared were found of use, while albumen water was worse than useless. Drugs, with the exception of purgatives and perhaps of emetine hydrochloride, were equally useless. Two practical points may be emphasized: first, that the prevalence of enteritis was proportionate to the prevalence of flies; second, that every single infant admitted was having as its staple article of diet some form of sweetened condensed milk. Inquiry was made at the Public Health Department with the object of comparing the relative mortality of enteritis at home

and at Malta. It was found that over a similar period of years the mortality at Malta was four times greater per thousand births than at home.

Kala-azar.—Of the seventeen cases of kala-azar, one appears to have completely recovered, since four years after being discharged from hospital his medical officer reported that the spleen was normal in size and the general health excellent. Another case, a year after discharge, was reported as improving. The rest all died either in hospital or at home. Fourteen cases had injections of salvarsan; three developed cancrum oris. As regards the question of the transmission of kala-azar by dogs (ten per cent. of which are known to be infected), it is interesting to note that, although all infected dogs were put to death, in one instance only was there even a reasonable possibility that a child had been directly infected by a dog. The youngest case was four months old. In all cases the parasite was found in smears from either spleen, liver, or bone marrow.

Intussusception.—The two cases mentioned occurred in infants, aged 6 and 8 months. They had been ill less than twenty-four hours. The classical sausage-shaped tumour was not palpable, and yet the intussusceptum had reached the anus. Reduction was easily effected by combined laparotomy and manipulation. Both patients appeared to bear the operation well, but they died a few hours later.

Hernia.—Three of the cases occurred in women who were pregnant from three to five months at the time of operation and the pregnancy was unaffected.

Ovariectomy.—The eight cases of ovariectomy were all operated on for multilocular cystic enlargement of the ovary.

Hysterectomy.—The three supravaginal hysterectomies were all performed for multiple fibromyomata. The pan-hysterectomy was done for carcinoma of the cervix, which was demonstrated microscopically. The patient was examined two years later when there was no sign of recurrence.

Amputation of the Cervix.—It is interesting to note that the case quoted, although having every appearance clinically of a carcinoma, was diagnosed microscopically as adenoma. This was subsequently proved correct by the fact that on becoming pregnant she went to term and had a normal labour.

Hæmorrhage of the Newly-born.—Hæmorrhage occurred in one case from the mouth and anus on the third and fourth days, and in another case from the umbilicus on the eleventh day, though the cord had separated on the fifth day. Both cases recovered.

Polydactylism.—Polydactylism of the thumb occurred in one case.

EXCISION OF WOUNDS.

BY CAPTAIN GEORGE G. TABUTEAU.

Royal Army Medical Corps.

THE general treatment of wounds in war has been very freely discussed during this campaign by many observers, chiefly with reference to special parts of the body, e.g., wounds of joints, blood-vessels, nerves, etc.; but I think there still remains one class of wound treatment of which might bear discussion—I allude to those furrowed gaping wounds of the skin and subcutaneous tissues. One knows only too well the extremely slow and tedious convalescence these wounds entail on those thus injured if treated on the old lines by fomentation, etc., and allowed to slowly heal by the production of granulation tissue, with its resulting thin scar tissue, muscle hernia, etc. To all this must be added the amount of labour involved in the frequent changing of dressings necessary in the attempt to render the part aseptic; and one must not forget that the longer the healing process takes, the longer period the man will be away from his proper sphere of action, i.e., the firing line. Nor must the question of expense in the large amount of dressings used during the course of healing be entirely overlooked.

Some twenty-five cases of this type have been operated on in this hospital. The number is not very large, but in the natural course of events one does not expect to meet with as many of this type of wound as of penetrating wounds. Still, these cases tend to prove that with due care the time spent in hospital may be very considerably shortened, and thus the man will be all the quicker returned to his unit.

The greater number of this type of wound are eminently suitable for early excision *in toto*; closing the new wound with sutures and thus converting a septic raw surface into a plain linear scar, which in most cases should be healed and stitches removed on the eighth day like an ordinary aseptic operation.

Our attempts at primary excision need not be confined solely to those wounds in which only the skin and subcutaneous tissues are involved. In many instances even where the deeper muscles have been severed the affected portion may be excised and the vivified surface brought together. The only bar to operation is the presence of important vessels or nerves in the line of operation. The amount of primary gaping will depend very largely on the direction of the wound on the skin surface, i.e., the edges of a wound in the skin tend to retract to a varying amount according to direction of the wound. In some of these cases the distance between the skin margins has been as much as four inches, and yet a linear scar was obtained.

Our rule in the treatment of these cases has been to operate as *early* as possible after admission. Attempts to render the wound “surgically” clean usually tend to spoil the after result. This may be due to the

continual wet dressings having had a softening effect on the surrounding skin and to its possibly becoming infected with some of the organisms from the wound.

Our technique has been framed so as to combine the maximum simplicity with the most absolute attention to strict asepsis.

On admission the wound surface is covered with a layer of gauze soaked in saline and sodium citrate solution. This dressing need not be changed more than once in twenty-four hours. It should be kept moistened with superimposed layers of gauze soaked in the same solution which ought to be changed at frequent intervals, care being taken not to wet the adjoining skin area, which is kept thoroughly washed with ether or spirit. In the theatre the skin around the wound is again washed with ether and when thoroughly dry painted with tincture of iodine. The wound itself is scrubbed over with a gauze swab soaked in tincture of iodine, special attention being paid to overhanging edges or pockets. Then an incision is made, usually about half to one-third of an inch from the skin edge around the wound starting from one or other end, and the "flap" is lifted up: the easiest way being to fix the angle of the wound at which the incision is begun with a Kocher's forceps; this enables one to make certain that only healthy tissue is being incised. It is absolutely essential that the cutting be done with a sharp scalpel and that the entire infected tissue be removed *en masse*. Any "button-holing" of the flap should be avoided. It will be found in most cases, no matter what the amount of gaping, where flesh has not been carried away, that with a moderate amount of undercutting and the insertion of a few tension sutures the skin edges can be readily brought together. It is most important that the sutures should be inserted through skin at some distance from the cut margin and be carried deep to the excised portion in order to obliterate any possible potential cavity. The success of the operation depends almost as much on obtaining by perfect hæmostasis a dry wound as on the technique employed. It must be remembered that one is excising an already septic area and it is only by attention to detail that the infection will not be conveyed to the fresh cut surface. It may sometimes be necessary to leave a small drainage tube in the most dependent part of the excision. With very few exceptions all these cases were operated on under local anæsthesia, novocain one per cent. with the addition of some adrenalin.

The dressing employed has been a wound varnish, viz.:—

Mastisol ..	..	..	..	..	54 per cent.
Benzol ..	..	..	..	..	45 ..
Picric acid ..	..	..	..	..	1 ..

kindly given to me by Colonel Gray, A.M.S., which he has largely used in practice in Aberdeen. This is painted on the skin, and when sticky a double layer of gauze applied in such a way as to take as much tension off the wound as possible.



Photo 1.



Photo 2.

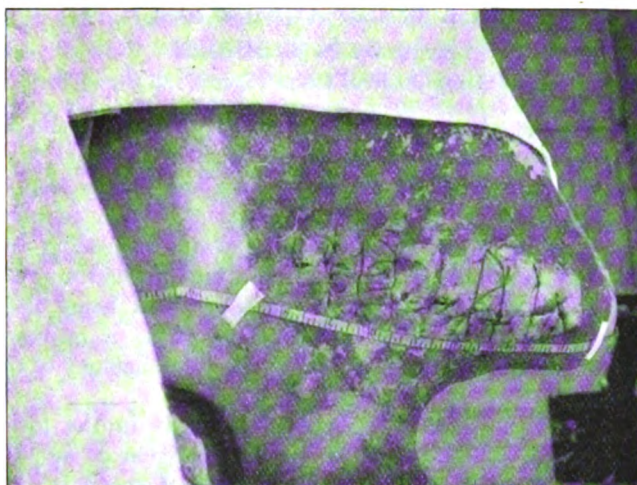


Photo 3.

One of the great advantages of this varnish is the small amount of dressing needed, and the ease with which the condition and progress of the wound can be watched. The application of a splint is very necessary in case of wounds of the extremities.

The size of the wounds has varied from comparatively small ones, measuring 3 in. by 1 in., up to one which stretched from the anterior superior iliac spine to the spine of the scapula and measured 20 in. long and 4 in. at its widest part. The length of convalescence in a case of this sort not operated on can be very readily conceived. Another case was quoted in the *British Medical Journal*, June 12, 1915, p. 1021, in which the wound extended across the lumbar region, involved the lumbar fascia and part of the lumbar muscles, and measured 11 in. by $\frac{1}{2}$ 3 in. by 2 in. deep.

I attach three photographs illustrating the type of wound under discussion.

Patient was admitted with a large gaping wound across the left scapular region cutting through skin superficial, deep fascia, and muscle.

Photo No. 1 shows condition at the commencement of the operation.

Photo No. 2, on completion of the operation. It will be noted that in this case a small drainage tube was inserted in both angles of the wound to prevent the accumulation of any serum. These tubes were removed forty-eight hours after operation.

Photo No. 3 shows the wound on the eighth day, when the stitches were removed.

A RAPID METHOD OF ERECTING SHELTERS FOR WOUNDED IN A FIELD AMBULANCE.

LIEUTENANT E. T. BURKE.

Royal Army Medical Corps (Special Reserve.)

WHILE efficiency in every unit of the Army is of the very first importance, mobility runs it a very close second. The ideal, is of course, to have the two combined. Naturally, before any unit is sent on active service, one presupposes that it is efficient. When once efficiency is attained, every effort should then be made towards "speeding up."

A Field Ambulance consists of so much medical and surgical equipment, stores, blankets and baggage generally; and being liable to be moved at very short notice, during an advance or a retirement, this principle of "speeding up" is essential if the full efficiency of the unit is to be utilized.

Where time is lost in a Field Ambulance is in the forming and packing up of a dressing station by the tent division or sub-division of one section, as the case may be. The secret of speed in erecting or striking a dressing station, is that each man of the personnel must be

detailed to one job, and know it ; but the one point where time is lost, and on which too many men are engaged, is in the erection of shelters for the wounded.

The material for the formation of an advanced dressing station is carried in the medical store cart (or, as it is in the 1915 War Establishments, in No. 1 limber cart). In this cart there are no bell-tents. The materials from which shelters are made (when buildings are not available) consist of ten G.S. blankets, and ten waterproof ground-sheets.

In "Royal Army Medical Corps Training," p. 113, para. 203, dealing with the formation of a dressing station, it says "The Medical Store Cart will be unpacked ; ground-sheets (if required), blankets and the necessary medical and surgical equipment taken out."

Now it may happen that casualties may come in very quickly and in great numbers, so that any buildings which might have been available would soon become full up, and then it would become necessary to house the wounded in some other way, or at least protect them from the sun or rain, by utilizing the materials to hand, viz., the blankets and ground-sheets. This is especially so when the contents of the medical store cart alone are available, but it also holds good even when bell-tents can be had, for the simple reason that the pitching and striking of bell-tents, takes a long time, occupies too many of the tent sub-division personnel, and besides the tents would only be used probably for a very short time, hence they are not worth the time and trouble expended in putting them up, when improvised shelters would do as well.

In the "Field Service Pocket Book," 1914, opposite p. 46, is a plate giving illustrations of different types of bivouacs and shelters. However useful these may be for sheltering unwounded men, it has been our experience in a Field Ambulance dealing with sham casualties (and it must be even more so when the casualties are real) that these take too much time to erect, they occupy the energies of too many of the personnel, and that when they are erected they are unstable, and altogether unsatisfactory for the shelter of the wounded. These shelters require too many small pieces of wood and short lengths of rope, which usually get lost, and are never to be found when they are wanted.

After trying several methods and types of bivouac architecture, the following method has been proved to be the best. It has four distinct advantages :—

- (1) Ten shelters can be erected in ten minutes, by four men.
- (2) The materials for their erection are always together, and pack into the minimum of space.
- (3) The shelters are efficient in every way and admit of a stretcher with the patient on it being put under them easily.
- (4) They can be taken down and packed away in ten minutes.

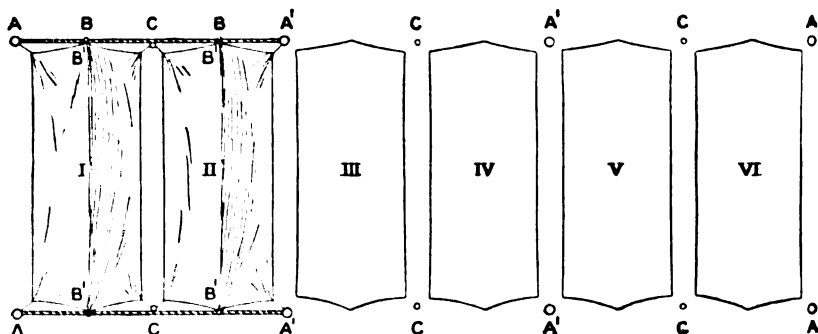
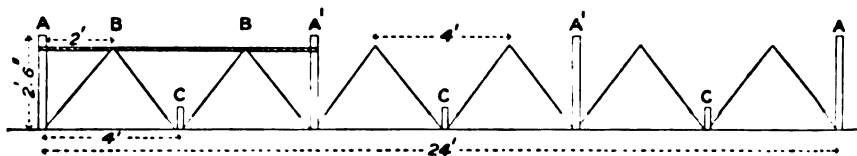
The method is very simple, and is illustrated by the sketches.

The blankets and ground-sheets are divided into two lots, six in one

lot and four in the other. Each set of blankets is strung together in a certain manner, so that six shelters are formed in the one case, and four in the other, i.e., ten in all. In each shelter is placed one ground-sheet. The object of having two sets is because, if the ten were strung together, they would be too cumbersome and unwieldy.

The articles required for six shelters are as follows :—

- (1) Six G.S. blankets.
- (2) Six ground-sheets.
- (3) Eight stakes, three feet six inches high and three inches in diameter, and pointed at one end (A in sketch).
- (4) Six small pegs, e.g., tent pegs (C in sketch).
- (5) Two ropes, e.g., clothes ropes, each twenty-four inches long.
- (6) Thirty-six pieces of strong cord, each nine inches long.



The procedure is as follows :—

Drive in the four stakes to enclose a rectangular area measuring eight feet by twenty-four feet. Join the two longest sides of the rectangle by the two ropes A. (A'A' are stakes driven in along the line A at intervals of eight feet, to which the clothes ropes are fixed permanently.) These ropes must be made as taut as possible. Midway between the two stakes, drive in the pegs CCC. Tie the pieces of cord on to the rope AA; the first one at B which is two feet from A, then the next piece of cord is four feet from the first one, and so on.

The next process is to fold the blankets lengthwise along their centre.

Then BB' will be the extreme ends of the ridge of the shelter. These ends are now firmly tied to the piece of cord, which is fixed to the rope at B. All that now remains to complete the shelter is to firmly fix a piece of cord to each corner of the blanket at E, and then secure the corners AA., CC., and one shelter is completed. Similarly for the other blankets. Where the cords are attached to other blankets, a round stone should be placed in the blanket, and the cord fastened round that; this prevents the blanket tearing.

If a patient in the middle shelter requires to be examined, either the stretcher in which he is laying may be drawn out, or one side of the blanket may be unfastened and folded over the other side, and thus afford the medical officer access to the wounded man.

The striking and packing is equally simple. First of all, the pegs lettered C are uprooted with the cords still attached to them, this prevents the pegs getting lost. Then the stakes AAAA are uprooted. The whole series of shelters then falls to the ground. Two men now do the folding. AA are left lying. One man goes to each side of No. 1 blanket and folds it along the ridge BB', spreading it out flat. The same is done to the next blanket, No. 2, which is folded on the first one, and so on. The pegs CC, etc., are placed towards the centre of the blanket. Finally, the stakes AAAA are put on the pile of blankets, along with the ground-sheets, and the whole rolled like a Wolseley valise, and secured with a rope or securing strap, and then packed in the medical store cart. Once the shelters have been erected and the cords and pegs fixed properly, in order to again erect them, the stakes AA at the end are first driven in, then the whole is extended like a concertina, and the stakes at the other end driven in. Then the pegs CC are put in their position, and the shelters are complete.

In the working out of this method, I have to thank Lieutenant A. Poole, R.A.M.C., Serjeant McIntyre and Corporal Buxton, of B Section, 40th Field Ambulance, for help and advice.

POST-MORTEM APPEARANCES OF SEPTICÆMIA RESULTING FROM "GAS POISONING" AND THEIR RELATIONS TO ANTI-TYPHOID INOCULATION STATISTICS.

A PLEA FOR ACCURATE BACTERIOLOGICAL DIAGNOSIS.

By LIEUTENANT ARNOLD RENSHAW.

Royal Army Medical Corps.

THE following case, which occurred during the course of epidemic cerebrospinal meningitis investigations in the Stephen Ralli Laboratory, Brighton, is of considerable interest, *re*: (a) Possible discrediting of value of anti-typhoid inoculation, with accompanying error in compilation of statistics; (b) post-mortem appearances of "gas septicæmia"; (c) diagnosis between enteric fever and "gas pneumonia."

CASE.

Private A. D., 1st Dorsets, Isolation Hospital, Eastbourne. Had been inoculated for typhoid since the war started. Invalided about May 14 from gas effects. Apparently recovered except for slight shortness of breath, and was allowed to be up and about. He was suddenly taken ill at 10 a.m. on May 27, and died at 4 p.m. same day.

Clinical diagnosis was epidemic cerebrospinal meningitis. Cerebrospinal fluid was collected and forwarded for examination. This was negative as regards meningitis.

Post-mortem examination performed on May 28, prior to swabbing contacts. Seven medical men were present, including two trained pathologists.

Post-mortem Appearances.—(Main facts only are given.) Meninges: congested, but no inflammatory exudate present. Brain: small punctiform hæmorrhages. Lateral ventricles: normal, no distension, no pus. Lungs: right lung practically normal; left lung much congested throughout, and in state of splenization, part in state of consolidation and sinking in water. Spleen: enlarged considerably, not particularly diffuent, but very dark coloured. Mesenteric glands: enlarged. Peyer's patches in region of cæcum much enlarged, swollen, and congested, and raised above surrounding surface. Solitary follicles much enlarged, distinctly raised and swollen, and very noticeable, causing mucous membrane to appear as if studded with pearls.

Subsequent Bacteriological Examination.—Spleen, lung, and meninges absolutely sterile as far as typhoid bacilli were concerned. A Gram-stained blood-film elucidated the problem, very large numbers of definite pneumococci being present.

Subsequent Histological Examination.—Lung: in state of croupous pneumonia, alveoli being filled with leucocytes (polymorphous). Not very many organisms to be seen; pneumococci being present, but remarkably scanty. Peyer's patch: lymphoid increase, necrosis towards superficial epithelium. Many Gram-negative bacilli present in necrotic portion—probably *Bacillus coli* and saprophytes. Brain: hæmorrhages. Leucocytes present in brain substance. Spleen: congested. Some of the pulp-cells stained faintly, as also their nuclei. Large numbers of erythrocytes were present; but no organisms could be detected in section examined.

SUMMARY.

The previous gas effect on lungs had apparently lowered the resistance of the lungs.

The appearance of the intestines, mesenteric glands, and spleen was regarded at the post-mortem as due to enteric fever in an inoculated man.

The appearance of the left lung was regarded as due to an early typhoid pneumonia, predisposed to by gas effect. In this we all con-

curred, including Professor Samut (the Government Pathologist at Malta), who was present, and who has had considerable experience of typhoid and paratyphoid fever post-mortem examinations. The distribution of the patches enabled paratyphoid fever to be eliminated.

The subsequent bacteriological examination showed that had the matter rested on the results of the post-mortem examination a totally erroneous conception would have been held.

Death was due to pneumonia and pneumococcal septicæmia. The exaggerated appearances of Peyer's patches and mesenteric glands (enlarged in many septicæmias) was probably due to easy access of organisms to the blood-stream through a lung damaged by gas, so that the lymphoid tissues were considerably stimulated, and an appearance resembling enteric fever occurred.

Indication.—In view of the numerous gas cases occurring it is probable that similar cases will require for their elucidation a post-mortem examination. In view of the importance attached to inoculation statistics, the intestines will probably be opened up. If this occurs the anti-typhoid inoculation statistics will be considerably vitiated. I would suggest that in such cases, to ensure accuracy, the spleen be forwarded to a laboratory for bacteriological examination, together with a blood-film.

The post-mortem appearance was that of an early case of enteric fever (first week), in which death occurred from a typhoid pneumonia, which in the early stages may be croupous in character; whereas bacteriologically the pneumococcus was found to be the organism concerned.

SOME NOTES ON THE USE OF SENSITIZED STREPTOCOCCAL VACCINE IN INFECTED GUNSHOT WOUNDS, AND A REPORT ON A CASE IN WHICH IT WAS USED.

BY CAPTAIN H. G. GIBSON.

Royal Army Medical Corps.

IN this country there has been up to the present time a certain amount of prejudice against the use of sensitized vaccines. Although there seems to be no special advantage in their use prophylactically, there are many advantages in their use for the treatment of acute conditions.

Several cases in which successful treatment by sensitized streptococcal vaccine has been employed have been published in this country.¹

I am publishing a case of streptococcal infection of a gunshot wound, together with the temperature chart, as it shows more or less graphically some points in the use of the vaccine. The great advantage of the sensitized vaccine lies in the fact that it can be used without any danger

¹ "Sensitized Vaccine in Acute Bacterial Infection," Dr. M. H. Gordon, M.A., M.D.Oxon., B.Sc., *Lancet*, June 28, 1913.

in acute streptococcal infections, and no reaction either local or general follows the injection of a dose. Owing to the fact that bacterial cells when brought into contact with their specific antibodies are combined with those antibodies to the exclusion of all other substances, we are able to bring the streptococci into contact with the immune serum, wash away the serum again and leave the cocci loosely combined with the antibody.

In this instance the vaccine used for the treatment of the case differed from that first introduced by Besredka in 1902, in that it was killed by exposure to one per cent carbolic, while he used a living vaccine.

Its mode of action is difficult to explain. In small doses no antibodies are demonstrable in the blood and yet there may be a marked improvement in the clinical condition of the patient. Some observers state that if large doses of the vaccine are employed they can show the presence of antibody in the blood of the patient.

In the ordinary way the dosage can be regulated by the clinical condition of the patient alone, and this way seems to me to be quite satisfactory. The beneficial results of the treatment may be judged in the usual way:—

- (1) The subjective feelings of the patient.
- (2) The improvement of his appetite.
- (3) The increased desire for sleep.
- (4) The fall of temperature.

Any one of these shows an improvement in his condition, and the greater the combination of the four the greater the improvement. The temperature as a rule is the last symptom to come under the influence of the vaccine, and sometimes takes several days before it drops to the normal, while in other cases several courses of the vaccine may be necessary before the temperature finally remains down and recovery is secured.

While any pus remains occluded the temperature remains up, in fact an improved condition of the patient with fever still present points to the presence of pus.

The vaccine is best given by the intensive method of Fornet and Muller, that is in increasing doses on successive days. The dosage should start with a dose of about 25 to 50 million cocci, and be increased daily up to about 500 million, reaching this figure about the fourth day of the treatment. By this time it will have been seen whether it is necessary to further increase the dose, which may be given as high as 2,000 million at a time.

Usually as good results are obtainable with small doses as with large ones, and the daily administration of the vaccine should not be continued for too long. It is much better to give a rest for a day or two, and then to start another course of the treatment than to continue with the treatment without a break and to risk the ultimate non-efficacy of the vaccine. If after the temperature falls it again commences to rise, a

further course of the treatment should be started. This is shown in the report of the case attached to these notes in which I had to give three courses of vaccine, the last being a course of vaccine obtained from an autogenous strain, before I obtained a satisfactory result.

With a sensitized vaccine it is not nearly so important to use an autogenous strain as in the case of ordinary vaccines, and in many cases a stock vaccine produces just as good results.

THE PREPARATION OF THE VACCINE.

The strain of streptococcus used is pyogenes, and it has been found that this strain is almost invariably present in cases of septicæmia arising from surgical causes.

At first Gordon used five different strains, but gradually reduced them until he finally used one strain of pyogenes alone. The preparation is simple and rapid.

After the culture (whether isolated from the patient, or a stock culture is used) has been tested for purity, it is subcultured into four or five nutrient broth tubes. As a rough estimate of the number of broth tubes that will be required for a given amount of vaccine to be obtained, it may be taken that each tube will contain 20,000 million cocci. These subcultures will have reached their maximum growth in forty-eight hours.

From this point there are seven steps in the process of preparation:—

(1) The supernatant broth is pipetted off with a sterile pipette, and the residues are poured into a sterile centrifuge tube.

(2) The tube is then spun for half an hour, and the remainder of the broth is then pipetted off.

(3) Five c.c. of normal saline is added, and the clump of cocci at the bottom of the tube is well broken up with a button-hole wire, the ordinary wire for wiring flowers, and a uniform emulsion is obtained.

(4) When this has been accomplished, ten c.c. of anti-streptococcic pyogenes serum is added to the mixture of streptococci and saline. The serum used for sensitizing the cocci should be that made by the Pasteur Institute, as a much higher degree of sensitization is obtained with this serum than with any other.

The serum is well mixed with the saline emulsion and allowed to remain in contact at room temperature for twenty-four to thirty-six hours. At the end of this time the cocci should have agglutinated and settled to the bottom of the tube leaving the serum clear. If they are not all down the tube should be spun again for a few minutes. If the vaccine is required very quickly, the mixture of saline emulsion and serum may be placed in the 37° C. incubator for one hour instead of standing at room temperature for twenty-four hours.

(5) The serum and saline is now pipetted off, and replaced by one

per cent carbolic in normal saline, the cocci again broken up with the wire loop, and the tube centrifuged for thirty to forty-five minutes.

By this time the streptococci are killed. A test for sterility may be made at this time.

(6) The saline is then removed and replaced by 0.5 per cent carbolic in normal saline; an even emulsion obtained, and the vaccine standardized. This may be done by the opacity method. Although a rough method, it is sufficiently accurate for a sensitized vaccine, and may be conveniently done in the following manner.

It has been found by experiment that an emulsion of streptococci in which just a trace of opacity can be detected contains 100 million cocci per c.c.

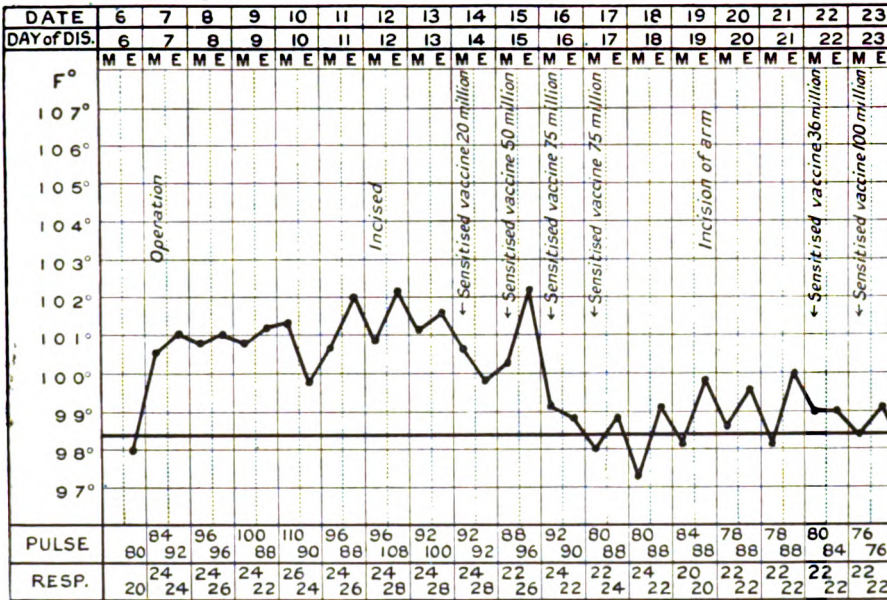
If 0.1 c.c. of the emulsion is placed in a tube, and saline is added until there is only a suspicion of opacity, the dilution then contains 100 million cocci. Supposing 0.1 c.c. of the original emulsion had been made up to 1.5 c.c. with saline before the desired trace of opacity had been obtained, then the 0.1 c.c. of the original emulsion contained 1,500 million cocci, and 1 c.c. contained 15,000 million.

(7) Convenient working dilutions of the vaccine are 100,500, and 1,000 million, and these are made up from the original emulsion with 0.5 per cent carbolic saline. The finished vaccine is put up in any of the ordinary ways, and after twenty-four hours a percentage of the ampules or the stock bottle is tested for sterility. Before the administration of a dose the vaccine should be well shaken up, as there is a tendency for the cocci to become clumped, but these easily break up with a little shaking. After keeping for three or four months the vaccine is liable to become desensitized, and should not be used after that period.

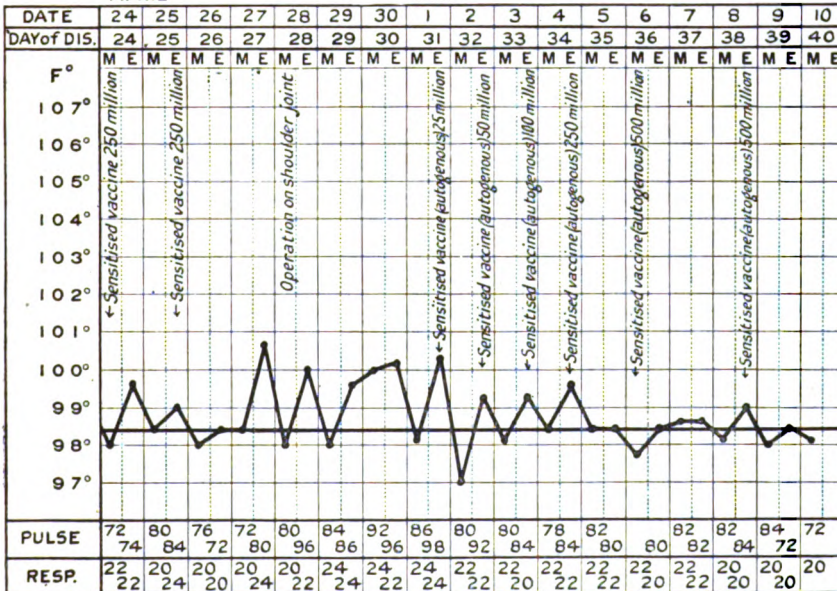
CASE OF STREPTOCOCCAL INFECTION OF A GUNSHOT WOUND TREATED WITH SENSITIZED STREPTOCOCCAL VACCINE.

This case which I treated with sensitized streptococcal vaccine shows very well the fall of temperature after each course of inoculations, the necessity in this case of three courses, and the extraordinary good clinical condition of the patient when he was suffering from a streptococcal infection of the shoulder-joint. The case was an officer, fifty-one years of age, who was admitted into Queen Alexandra's Military Hospital, Millbank, on April 6, 1915. He had been wounded by a fragment of a bomb which entered his left shoulder and carried a considerable portion of clothing into the wound. This had taken place five days previously. On admission to hospital he was suffering from a good deal of pain, and was somewhat exhausted after the journey. His temperature was 98° F., and pulse 80. On the next morning he had a rise of temperature, and the wound was opened and cleaned up. His temperature

APRIL 1915.



APRIL MAY



remained about 101° F., and on April 10 I was asked to take a culture from the wound. The organisms present were *Streptococcus pyogenes* and *Staphylococcus albus*.

On April 12 he was a good deal worse, taking food indifferently and sleeping badly. There was a red area slowly spreading down the arm, and a thin serous discharge from the wounds. The arm was incised again.

On April 14 there was no apparent change, and it was decided to try some sensitized streptococcus pyogenes vaccine. I gave him 20 million streptococci at 10.30 a.m., and by late that evening his condition had already improved. He passed a good night, and by the morning his appetite showed some improvement. He stated that "he felt a different man." There was no sign of any general or local reaction whatever after the inoculation.

I repeated the vaccine with a dose of 50 million. His temperature in the evening rose to 102.2° F., but he was quite comfortable and passed a good night. In the morning (April 16, 1915) his temperature had fallen to 99.2° F. The wound had cleaned up a great deal, and healthy granulations were forming. A dose of 75 million was given. On the next day improvement being continued the same dose as the day before was repeated. By this time the improvement in the patient's condition was most marked, and his mental condition had undergone a great change. Before the course of inoculation he had been very depressed, whereas now he was quite cheerful. However, his temperature showed a tendency to rise again although his condition remained good, and on April 19 a pocket of pus was opened, and about one pint of pus evacuated.

On April 22, as his condition had gone back somewhat and his temperature remained up, I started a second course of vaccine. Four doses of 36, 100, 250 and 250 million were given on four successive days. He immediately came under the influence of the vaccine. His mental condition, sleep, and appetite improved again after the first two doses, and his temperature had fallen to normal on the fifth day. It did not stay down for long, however. Two days later it rose suddenly to 100.6° F. Pus was located in his subacromial bursa, and on April 28 when it was opened it was found to communicate with the joint. The joint was opened in front and behind, and a drainage tube put right through.

His temperature was still remaining up three days later, so I decided to start another course of vaccine, using his own strain of streptococcus which I had obtained from the pus on April 19. I started with an initial dose of 25 million, and repeated it on May 2, 3, and 4, in doses of 50, 100, and 250 million. On May 4 the wounds were looking very much cleaner, and his appetite was fair. He was sleeping well, but was having sleeping draughts owing to pain in his shoulder due to movement when dropping off to sleep.

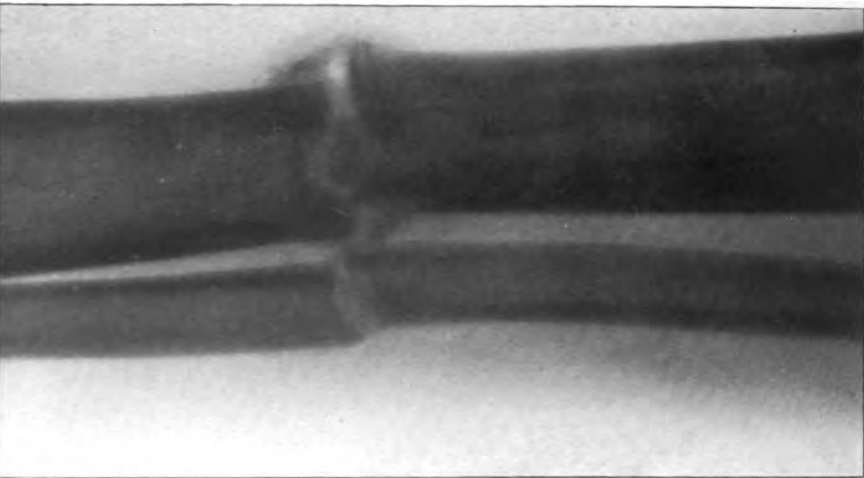


FIG. 1.—Antero-posterior View.

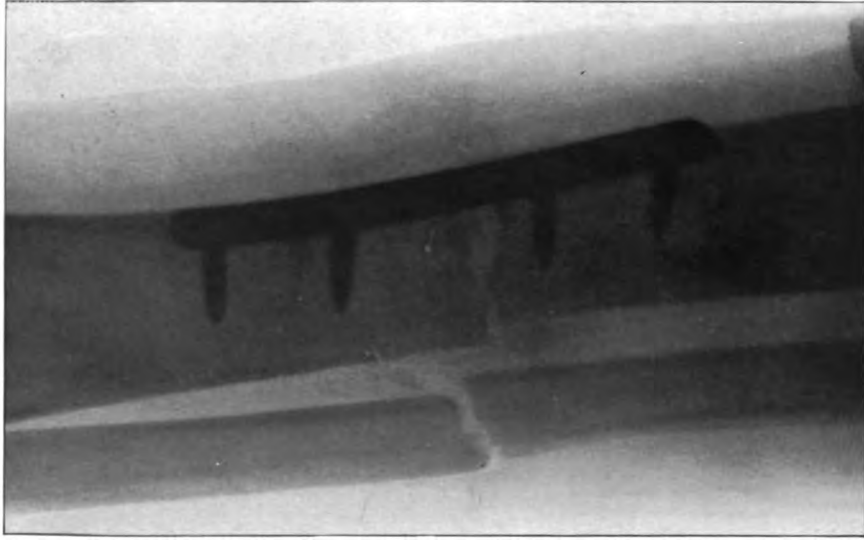


FIG. 2.

To illustrate "A Case of Ununited Fracture of the Tibia and Fibula," by Captain J. H. M. FROHNER, R.A.M.C.

On May 5 his temperature had fallen to normal.

On May 6 I gave him another dose of 500 million, and repeated this on May 8.

At this time he was getting up. He still had a drainage tube through his shoulder-joint but the discharge had very much decreased in quantity. He had no further rise of temperature, and made an uninterrupted recovery.

I am indebted to Lieutenant-Colonel E. M. Pilcher, D.S.O., R.A.M.C., for the free hand he gave me in the treatment of the case, and for permission to publish it.

A CASE OF UNUNITED FRACTURE OF THE TIBIA AND FIBULA.

BY CAPTAIN J. H. M. FROBISHER.

Royal Army Medical Corps.

PRIVATE L., 4th Rifle Brigade, was admitted to the Station Hospital, Ambala, from Dagshai, where in July, 1914, he sustained a fracture of the tibia and fibula. He was treated with splints and plaster, but fell and injured his leg again while going about on crutches. In spite of rest in splints, massage, etc., the tibia remained ununited. On admission to Ambala in December there was very little union of the bones, and plating was decided on. A Lane's plate was applied on January 15 to the tibia, after freshening the ends of the bone and correcting the slight existing deformity. The wound healed by first intention and the leg was put in a Stimpson's plaster three weeks later. Union was firm by the end of February, and it was decided to remove the plate, as being subcutaneous it might have led to trouble afterwards. This was done in the beginning of March, and at the same time the tendo Achillis was tenotomized and passive movement done for stiffness of the ankle. By the middle of March the patient was walking with the aid of a stick and he was sent home at the end of March as his unit had already gone on service. When he left Ambala there was only the slightest limp due to some little stiffness in the ankle which was rapidly disappearing.

Two skiagrams show the result of treatment. They are taken from the front. Other lateral views taken also show the bones to be in perfect position.

The fibula was not touched as it was not thought necessary, and this was borne out by the subsequent result.

**A DEPILATORY FOR PREPARING THE SCALP AND OTHER
AREAS FOR OPERATIONS AT THE FRONT.****BY MAJOR A. DON.***Royal Army Medical Corps (T.F.).*

THOSE of us who are working at the Front are often faced with the problem of how to clean a large area like the scalp in a short time.

The hair is first cut with scissors or a clipper and is next washed to loosen the clotted hair. The depilatory, which is a mixture of sodium sulphide, cold water starch, and fine unslaked lime, is then mixed to a consistency of thick soup and is immediately rubbed well into the whole scalp. In seven to ten minutes, which is about the time one takes out here to prepare oneself for a head operation, the whole can be taken off with the back of a spatula leaving the scalp quite bare and with no cuts like after many a shave. No further cleaning is required, but the operation area may be further prepared as desired. Such a method ensures that the tiny wound of entrance of a rifle bullet will not be overlooked, as often happens when shaving the area of exit alone is resorted to; no other injury being noticed on account of blood, or hair, or both.

The preparation is difficult to make up in such a way as to ensure its keeping, but I have always been able to get it from Paterson and Sons, Aberdeen, quickly and in good condition. I can recommend it as worth a trial, and I believe it is being fairly extensively used at present by those at the base who know the method.



Translations.

THE ENGLISH INFANTRY BULLETS AND THEIR ACTION.

By PROFESSOR DR. K. STARGARDT.

From the Reserve Military Hospital II, Hamburg-Altona (The General Hospital of St. George).

(Translated from the *Muenchener medizinische Wochenschrift* of
December 29, 1914.)

In the daily press articles have frequently been written about the English bullets with explosive action, the so-called Dumdum. Also in the *Deutsche medizinische Wochenschrift* for November 5, Poppelmann has given an account of wounds supposed to have been due to Dumdum bullets.

Unfortunately, none of the communications have hitherto stated whether these wounds have occurred singly or in great numbers, nor whether they have been confined to special areas of hostilities or not. Nor has it anywhere been stated whether these wounds have to do with bullets provided by the State, or whether, and to what extent, the Dumdum bullet differs from the regular English infantry bullet; and further, whether and to what extent the wounds inflicted by the Dumdum bullets differ from those inflicted by the regular English infantry bullet.

Now I have in the Reserve Military Hospital, II, Hamburg-Altona, been able to make a series of observations which, it seems to me, solve the Dumdum question.

Whereas in Hamburg-Altona, during the first two months of the War, the wounded were solely recruited from troops fighting with the French, latterly the majority of the wounded have been admitted to hospital suffering from wounds incurred during fighting with English troops.

Between the two groups of wounded a striking clinical difference has been demonstrable, at least as far as infantry bullet wounds are concerned. Whereas the wounds inflicted by French infantry bullets were, as a rule, not very severe, and with exceptions indicated a satisfactory prognosis, even when bones or many vital organs were hit, this was certainly not the case with the wounds inflicted by the English infantry bullet. These wounds were throughout essentially more severe.

Fractures caused by bullets, for example, showed much greater shattering of the bones. The bones were in many cases directly crushed to pulp. Further, it was striking that the vessels and nerves were much more often hit, and muscle was much more extensively torn, than when the wounds were inflicted by the French infantry bullet. It need hardly

be emphasized that, corresponding with the severity of the wounds, infection of the wounds was much more common.

In certain cases a particularly large wound of exit was observed. One has often assumed that such large wounds of exit alone proved that the wounds are inflicted by Dumdum bullets. In my opinion this is not so. The large wound of exit can only raise the suspicion of a Dumdum wound, but does not furnish proof of such wound. For large wounds of exit can occasionally result from the French infantry bullet, particularly when the bullet has turned in the body. The clinical observation of the fact that wounds inflicted by the English infantry bullets were much more severe than those inflicted by the French infantry bullets, was confirmed by the X-ray pictures of certain cases, which also showed why the wounds inflicted by the English infantry bullets were so particularly severe. I have in the scientific meeting on November 21 in St. George's Hospital, and on December 1 in the Society of Physicians, shown a series of X-ray pictures which I propose to publish in a monograph with a number of new cases. Here I will state the most essential matters.

A characteristic feature of X-ray pictures of wounds inflicted by English infantry bullets is the extensive area of the wounded part, throughout which dense shadows are cast, and which can only be due to fragments of metal. In a study of such pictures one is at first inclined to think that the wounds have nothing to do with infantry bullets, but rather that they are inflicted by fragments of shell or shrapnel. The splinters are of the most varied size and shape. As a rule there are one to three large splinters and a host of minute splinters. Only in a few cases are the splinters confined to a limited area. As a rule they are scattered broadcast in the tissues. I will but mention a case in which, in a wound of the arm, a large splinter was found in the forearm, in fact in the radius, which had been shot through, while another large splinter lay close to the middle of the humerus, and the whole area between the two splinters was peppered with small and minute splinters. The splinters were, in fact, distributed over an area 25 cm. long of the wounded arm.

In several cases such fragments of metal had to be removed. An astonishing fact was disclosed during this process; it was found that these splinters were all portions of one infantry bullet. In most cases the one splinter consisted of the point of the bullet and measured somewhat more than 1 cm.; a second splinter, about 2 cm. long, consisted of the more or less deformed lead core; and a third consisted of the completely bent and torn upper casing. Further, it was particularly striking that, in the broken-off point of the bullet, a core was found about 1 cm. long, and with a smooth surface on its posterior aspect. It was not, therefore, a detached portion of the leaden core. The fact that the broken-up bullet contained two cores is of the greatest significance.

It is perfectly certain that an infantry bullet which breaks up in a

body in the manner described and scatters its constituent parts broadcast in the body, possesses an action which must be identified with an explosive action, and that such a bullet must be regarded as an explosive bullet. In this respect it is immaterial whether the explosive action of the bullet is due to explosives contained in it or to the special construction of the bullet.

It was natural to suppose that the above-mentioned wounds were inflicted by a particular kind of bullet, the so-called Dumdum. But this assumption is incorrect. Rather did careful investigation show that the wounds were inflicted by the regular English infantry bullet.

I have received a great number of English infantry bullets from soldiers. Outwardly the bullets resemble the German bullets, only they are longer, being 32 mm., as compared with the German, which are only 27 mm. long. Further, they show, 5 mm. from the base, a deep cross-shaped groove, in which the cartridge grips them at three points. In the English bullet, too, the leaden core is exposed behind.

While the English infantry bullet is superficially like the German, it shows a fundamental difference internally. I have let a goldsmith divide an English and a German bullet down the long axis. While the German bullet shows only a single leaden core, the English bullet contains two cores, in fact, one in front in the point measuring 11 mm. in length, and one behind, measuring 20 mm. in length, and separated from the other by a narrow line of demarcation. The front core is the lighter and of a whitish colour, and consists, as far as I have hitherto been able to ascertain, of aluminium. The posterior core is heavier and undoubtedly consists of lead.

The English bullet has an outer casing which is thinner by 0.1 mm. than that of the German bullet. The English infantry bullet which I have mentioned as being divided came from a Government factory, as the mark on the bore of the cartridge showed (an arrow consisting of three almost equally long lines), and differed in no respect from the numerous English bullets which our soldiers have brought from different areas in the fighting line.

It is obvious that, owing to its special construction, the bullet exercises an explosive action in the body of the person it strikes. As the bullet contains two cores of different specific gravity, it must disintegrate on the lightest contact with a firm body, such as a bone. The point with the one core must break off, the outer casing must be torn, and the second core, the leaden core, must fly out. As all the portions have a different shape and specific gravity, they must scatter in different ways in the part of the body which is hit.

The above-mentioned severe, indeed, to some extent absolutely abominable wounds, can be explained by reference to the construction of the bullet. I would lay particular stress on the fact that we have not hitherto in a single case found in the bodies of the wounded an English

infantry bullet which was not deformed. The breaking up of the bullet is not, therefore, an unfortunate accident, but an event which is the inevitable sequel to the construction of the bullet.

Now I have made inquiries of experts whether the use of two different cores of different specific gravity can have any ballistic reason. This has been quite decisively denied. There can, therefore, be only one reason which has been decisive for the use of two cores, the intention to cause the most severe injuries possible. And in my opinion there can be no doubt that this has been the decisive object in the construction of the bullet.

I would particularly emphasize that the severe wounds observed by us have not been inflicted by isolated, specially made Dumdum bullets, but by the only English infantry bullets, which are made in Government factories and officially introduced.

Precisely this fact, that the usual English infantry bullet, without needing special treatment, causes wounds which are exactly like those caused by the Dumdum, and must be like them on account of special construction, seems very noteworthy to me.

The English infantry bullet aims, not only at putting out of action, but also at mutilating for ever, whenever possible, the person who is hit. And our poor wounded show that this object of the English infantry bullet is completely fulfilled. Outwardly harmless-looking, the English infantry bullet, thanks to its special construction, is an exceedingly dangerous explosive bullet. And this explosive bullet is used against human beings.

I have already emphasized the fact that in most cases we have also found the point of the bullet in the body, and that, therefore, the bullet is certainly used as it is sent from the factory. In many cases, however, the point is previously broken off. This seems particularly to be the case in shooting at close range. The process of breaking off is effected, according to the statements of reliable witnesses, by placing five cartridges together in a sort of vice, which is found in the butt of the rifle, and by breaking off the points by two short, lever-like motions. The points are said to be very easily broken off, and the break, in fact, invariably occurs at the boundary between the anterior and posterior cores. Whether the action of such bullets, with the points broken off, is still more destructive than that of the bullet with the point retained, I am unable to say. It is conceivable.

It must, however, again be repeated with emphasis that the breaking-off of the point is certainly not necessary, but that the English infantry bullet, even with that point intact, exercises an explosive effect on striking.

At all events, it is the duty of the medical men to devote special attention to this question, so that it may be possible for the authorities to take steps against the use of such inhuman bullets.

REMARKS ON THE ACTION OF THE REGULAR INFANTRY
BULLET AND OF THE DUMDUM BULLET ON THE
HUMAN BODY.

BY PROFESSOR DR. M. KIRSCHENER.

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December 29, 1914.)

THE statement that the Dumdum bullet forbidden by the Geneva Convention has been issued by the enemy recurs regularly in all modern wars. The seriousness of such a charge requires that in every case the use of this notorious bullet should be absolutely proved.

When the German Government can officially state that special machines have been found in Belgium for the manufacture of these projectiles, when contrivances have been found on the stocks of enemy rifles with this object in view, when ready made Dumdum bullets have been taken from the enemy dead or prisoners, then no doubt can exist as to the use of this illegal type of bullet. On the other hand, medical statements, and since the outbreak of the present War such statements have been published, sometimes fail to provide such conclusive proof.

The reason for this is clear, for when medical men unacquainted with the wounds of warfare find very large and lacerated wounds, they are apt to dissociate these wounds from the regular, modern infantry bullet, and to assume that these wounds can only be explained by the supposition that Dumdums have been used.

It seems, therefore, advisable to consider the mode of action of the regular infantry bullet and of the Dumdum bullet, with special reference to this question.

THE CONSTRUCTION OF THE BULLETS.

Modern infantry bullets are either "Mantelgeschosse" or "Vollgeschosse." (a) The "Mantelgeschosse," erroneously also called "Vollmantelgeschosse," possess a coating of resistance steel ("Stahlblech") which surrounds the body of the bullet with a thin layer. The steel forms a cone, the covering of which is without flaw, except at the middle of the base of the bullet, where there is a large opening. The hollow space of this cone-like body is filled with a relatively soft material consisting of hard lead. This core of the bullet is completely exposed at the central opening in the base of the bullet. Examples of the "Mantelgeschosse" are the infantry bullets of the Germans, English, Russians and the Balkan States.

(b) The "Vollgeschosse" are solid bodies made of one material. The French infantry bullet, which consists of copper, is an example.

(c) Dumdum bullets are "Mantelgeschosse" the steel coating of which is incomplete also at the front end, so that the lead core is

exposed also at this point. The steel coating and lead core can be cut through at the same level in front, so that the core is exposed in transverse section. The top of the outer coating may be cut off, so that at the point of the bullet the core may project more or less from the steel coating. The bullet can be indented, a crater-like depression being made in its point. The point of the outer coating can be traversed by a single or a cross-shaped incision, or by several holes. The gap in the steel coating can be filled by a metal like aluminium, with little resisting power, so that the character of the Dumdum bullet is unrecognizable on inspection.

Such projectiles are on the one side turned out in a factory (for example, for sporting purposes); on the other hand, the regular "Mantelgeschoss" can be made in a few moments into a Dumdum bullet, even by any soldier, by the use of a file, a metal saw, pincers, gimlet, etc.

It is, however, perfectly impossible to convert a "Vollgeschoss" (which interests us particularly, as it is the regular French infantry bullet) into a Dumdum bullet. For if we pinch off its end, gouge or incise it, we do indeed change the shape of the solid projectile, but can never change it so that at its front end a soft metal core appears surrounded by a hard steel coating, such as is characteristic of the Dumdum bullet. The changes in shape of this bullet have no marked influence on its action. If, therefore, we find a true Dumdum bullet on a French soldier, then it cannot have been made by his own hands out of a regular French infantry bullet. In spite of this I have twice in this War seen notorious bullets taken from French soldiers.

THE ACTION OF THE REGULAR INFANTRY BULLET UNDER ORDINARY CONDITIONS.

If, as we at first assume as a usual occurrence, an undeformed "Mantelgeschoss" or a "Vollgeschoss" enters by its point into the human or animal body, the form of the channel made by the bullet is principally determined by, firstly, the nature of the tissues traversed, and, secondly, by the force of the bullet.

(a) If only soft tissues are struck, the shape of the channel made is roughly that of a cylinder, the diameter of which is that of the bullet. The same effect is observed when the projectile traverses spongy bone. The wounds of entry and exit are therefore in these cases small and round.

(b) The wound channel is quite different when compact bone has been struck. If the force of the bullet has not already been so exhausted that it is arrested by the bone, this is shattered. The amount of this shattering varies considerably and is directly proportional to the force of the projectile. This force is estimated according to the formula $1 = \frac{1}{2} m.v.^2$, i.e., it increases in the square of the velocity of the bullet, or,

in other words, the force of the bullet and its shattering effect on bone are inversely proportional to the distance travelled by the bullet.

At long range only a relatively smooth traverse rupture of the bone is made, and the X-ray picture of the injured area resembles that of an indirect fracture, as observed in times of peace. But the shorter the range, the more extensive is the involvement of the bone, until, at a range of 400 metres or less, the effect on bone is truly explosive. Numerous splinters of bone, varying in size, are not only detached, but are scattered broadcast in the neighbouring tissues. At very close range this shattering of splinters is so forcible that no bone is left in the channel of the wound previously occupied by bone. This has been scattered concentrically in the neighbouring structures. The X-ray picture in such cases resembles to a certain extent that of a bony cyst.

In such explosions of bone the neighbouring soft tissues peppered with splinters of bone are correspondingly lacerated, and cavities are formed filled with blood, shreds of tissue and particles of bone. If the radius of the explosion is greater than the thickness of the soft tissues covering the bone they become torn by the explosion, and the cavity of the wound is widely open to the exterior. As the splinters of bone are mainly projected in the direction taken by the bullet, an exceedingly large wound of exit, as compared with the wound of entry, is thus frequently made. The wounds of exit may be large at first.

(c) A similar explosive action of a bullet, with great destruction within the body, may be induced when, at close range, organs are hit which possess the physical properties of a closed capsule filled with fluid. Such organs are the stomach, intestine and bladder when filled, the liver, spleen, kidneys, heart and skull-cap. The entry of the projectile into such an organ suddenly increases the pressure which is conducted unabated to the walls of the organ in every direction, and thus gives an explosive impulse to the fluid within it.

THE OCCASIONAL ABNORMALITIES OF THE SHAPE AND POSITION OF THE REGULAR BULLET.

So far, the discussion of the action of the regular "Mantelgeschoss" and "Vollmantelgeschoss" has been based on the assumption that the bullet has reached the body, firstly with its point in front, and secondly in an undeformed condition. In practice these two assumptions are certainly not always correct.

(a) The centre of gravity of the infantry bullet does not lie in the middle of its long axis, but nearer its base, for it tapers steadily towards its point. The resistance opposed to the part of the bullet in front of its centre of gravity, first by the air and later by the tissues of the body, is considerably greater than the resistance opposed to that part of the bullet which is behind its centre of gravity. There is, therefore, greater obstruction to the front than to the back of the bullet. The front of the

bullet accordingly tends to lag behind, while the back of the bullet tends to come in the front. In other words, the bullet has a tendency to rotate on its transverse axis, so that its blunt end comes to the front.

This tendency is combated by the rotation of the bullet on its long axis. So long as this rotation is powerful, it is able to prevent the reversal of the projectile, at any rate while the bullet cuts through the only slightly resisting air. But when this rotation is much reduced after a long flight the bullet turns round, particularly when its point meets resistance (sand, branch of a tree, grass, etc.), obstruction being suddenly caused thereby. A projectile thus diverted from its original position may strike the human body with its base or side, or in an intermediate position.

(b) If the bullet, before reaching the human body, encounters hard, firm resistance (stone, frozen earth, particles of metal, coins, etc.), so that it glances off (ricochets) it may become considerably deformed, its outer casing being torn off or flattened and the leaden core being thereby partially protruded. If the objects encountered by the bullet before it reaches the human body are so small that they can be projected with considerable velocity (buttons, money, keys, etc.), they can penetrate the body as secondary projectiles.

(c) Bullets which strike the human body towards the end of their flight, in the regular manner with the point in front, turn, in my experience, owing to the resistance made by the body to the point, shortly after their entry into the body, during their passage through the soft tissues. I have, at any rate in the Balkan wars, frequently been able to ascertain, by X-ray pictures and by extractions of bullets, that the point of the bullet has turned backwards after being discharged. In my experience such a rotation of the bullet is almost the rule, while it is exceptional to find the bullet with its point in front.

Naturally these observations refer only to "Steckschussen." Almost without exception the force of the bullet has been much diminished towards the end of its flight, its rotation on its long axis has been much weakened, and its velocity has been so much reduced that it cannot escape from the body. It would be interesting to demonstrate by its passage at what range such a rotation of the bullet, during its passage through the soft tissues of the body, is to be expected. I am not in a position to judge whether, and if so to what extent, my observations were affected by the somewhat old rifles, with worn-out rifling, used by the Turks.

It is clear from the foregoing that a certain number of infantry bullets reach the surface of the body with the base in front, and others sideways or obliquely, the shape of the bullet being normal or deformed. Other bullets enter the body point foremost, but turn round as they traverse the soft tissues.

THE ACTION OF THE REGULAR INFANTRY BULLET, THE POSITION AND SHAPE OF WHICH HAVE BEEN CHANGED.

(a) If a bullet hits a body sideways, its passage through the soft tissues and spongy bone causes considerably greater destruction than when a projectile penetrates the body point foremost. The wounds of entry and exit may be large and irregular. The tissues can be most severely lacerated by a much deformed bullet. When a bullet, which has entered a body by its point, turns round as it traverses the soft tissues, there must be extensive laceration. The wound of exit also may be fairly large.

These wounds, the disproportional extent of which is impressive, are the result of the regular infantry bullet. They have nothing to do with the Dumdum bullet. On the other hand, projectiles which strike the body with the base foremost, and maintain this position during their passage through the soft tissues, do not inflict wounds essentially different from those inflicted by a bullet passing through the body point foremost.

(b) If a "Mantelgeschoss" strikes hard bone with its base foremost or in a transverse or oblique position, two separate actions must be considered. Firstly, there is the injury to the bone and surrounding soft tissues which is due to the force of the bullet, and is the same as that inflicted by a bullet traversing the body point foremost. Secondly, there may be distortion of the projectile, and an escape of the lead core, whereby further, secondary, destruction of the soft tissues is caused. As we see, the base of the regular bullet is not closed. Through this opening, therefore, the exposed lead core can be projected when the bullet strikes solid bone, with great velocity and with its base foremost. The lead core can likewise be pressed out of this opening when the outer casing is flattened as it strikes a bone sideways. The escape of the lead is facilitated and made more complete when the outer casing has been torn or deformed, and thus weakened by contact with some hard substance before it enters the body. The escaping lead core, on meeting bone, may itself become further deformed, and, under certain conditions, be broken up into several fragments. In the Balkan wars I have frequently found such deformed bullets in the neighbourhood of large bones, and it is possible sometimes to demonstrate in X-ray pictures (also *in statu ascendi*) that the principal escape of lead from the projectile has been through its base.

By the scattering of the fragments made by contact with the bone in this manner, the deformed bullet can extensively lacerate the soft tissues—like a Dumdum bullet—and under certain conditions inflict large wounds of exit. Such extensive wounds are only too easily attributed to Dumdum bullets, and this suspicion seems to be incontrovertible when an X-ray picture, or an operation, shows a disfigured steel casing or scattering of the lead core. These wounds do, however, belong, as previous observations have taught us, to the inevitable action of the regular, modern

infantry bullet. The (French) "Vollgeschoss" can also be distorted by contact with an object or with bone. Owing to its solid structure it can, however, never cause laceration to tissues by the escape of a metal core. From this point of view it is not dangerous.

(c) Small objects, which are driven into the body as secondary bullets, can cause the most varied lesions, according to their shape and nature. As a rule, they cause more extensive wounds than the infantry bullet.

(d) Further, it should be mentioned that, on shooting at point blank range, the powder gases may be driven into the wound channel, and tear it asunder in an explosive manner.

THE ACTION OF THE DUMDUM BULLET.

(a) When a Dumdum bullet strikes a living body, and comes in contact only with the soft tissues, the wound channel differs in no respect from that made by the "Mantelgeschoss," or the "Vollgeschoss." The passage of the bullet through only soft tissues makes a cylindrical wound channel of the diameter of the bullet, and there is no specific explosive action. Only when an encapsuled organ is struck at close range is there an explosive action, such as is also observed with the regular infantry bullet.

This apparently not generally recognized fact, that the striking of soft parts has no other effect than that of the regular projectile, is theoretically quite comprehensible. The steel casing of the Dumdum, which is open back and front, is so resistant that it does not become deformed by soft tissues, and the leaden core is so firmly adherent to the steel casing that it does not become squeezed out of it by the pressure of the soft tissues. Some years ago I had, by chance, the opportunity to collect practical observations about this subject on living objects. While big-game shooting in India, I was able to prove that, in spite of the regular use of Dumdum bullets, the wounds of entry and exit were invariably small when only the soft tissues were struck, and we regretted often enough the inefficiency of these bullets in these animals. I have also recently convinced myself of the correctness of this view by shooting experiments on the corpse with scientifically made Dumdum bullets.

(b) The specific action of the Dumdum bullets can only be provoked when it strikes a hard substance in the human body, i.e., a bone. The front end of the Dumdum bullet, which is not closed by a resistant covering, as in the case of the regular "Mantelgeschoss," but presents an open or interrupted prominence, when it strikes with sufficient velocity and meets sufficiently firm bone becomes more or less deformed. Following the laws of gravity, the lead core retains its original motion, and detaches itself from its casing and is wholly or partially ejected. As it consists of relatively soft metal, it can be shattered against bone, and be scattered about the surrounding structures. In its further course the deformed casing can also inflict further laceration of the tissues. Apart

from this specific action, the Dumdum bullet possesses, of course, the same action as the regular infantry bullet, which is dependent on the velocity of the bullet and the structure of the bone.

By the combined action of these two factors, the contact of a Dumdum bullet with bone may, under certain conditions, cause excessive destruction of the soft tissues, and quite disproportionately large wounds of exit.

CONCLUSIONS.

From the above remarks the following rules with regard to war may be formulated :—

(1) The only conclusive evidence that a wound has been inflicted by a Dumdum bullet is the recovery of the projectile in a so slightly deformed state that it can, with absolute certainty, be demonstrated that the continuity of the steel casing has been intentionally broken at the front end before the cartridge was discharged.

(2) Extensive destruction of the tissues, particularly large and lacerated wounds of entry and exit, do not of themselves afford proof of a Dumdum bullet; they occur rather with the use of the regular infantry bullet. They can, in fact, when only soft tissues have been wounded, have been due to the bullet striking sideways (with or without ricochetting), or to the ingress of a foreign body, or to a bullet wound inflicted at point-blank range, or to the ingress of the gases of the explosion. If bones are involved, the resultant action may be due to the usual explosive action of the regular bullet at close range.

(3) Even the presence of a mutilated steel casing in the wound, or the exit of lead from the steel casing, does not prove that a Dumdum bullet had been used, for the regular "Mantelgeschoss" may also be thus transformed, either before it reaches the human body, owing to ricochetting, or in the human body, when its point is not directed forwards, and when it comes in contact with solid bone.

(4) Only the "Mantelgeschoss" can under such conditions, when it strikes bone, injure the neighbouring soft tissues by the escape of the lead core. This action is impossible with the (French) "Vollgeschoss."

(5) If a Dumdum bullet strikes only soft tissues, it acts exactly like a regular infantry projectile. Its specific destructive action comes into play only when it strikes bone.

(6) "Vollgeschosse" (such as the regular French infantry bullets) cannot be transformed into Dumdum bullets.

NOTES BY LIEUTENANT-COLONEL E. M. PILCHER, D.S.O., R.A.M.C.

Professor Kirschener's paper is a fair presentment of the comparative effects of the modern pointed composite rifle bullet and of the so-called Dumdum bullet. He does not actually say he has seen wounds by Dumdum bullets in the human body, though the fact may perhaps be

inferred from his title and from the description he gives of such wounds. On the other hand, he refers to his experiences, while shooting big game, of the effects of Dumdum bullets on animal tissues. His descriptions are perhaps based upon these latter observations.

The chief conclusions at which he arrives are, firstly, that any composite bullet may be easily changed into a Dumdum bullet, and, secondly, that it is impossible, in most cases, from clinical features alone, to say that a wound has been caused by a Dumdum bullet. And he very properly emphasizes the consequent necessity of finding evidence of the existence of Dumdum ammunition before it has been fired.

Professor Kirschener's paper, in short, would almost seem to show that so exceedingly severe are the effects sometimes produced by the ballistic peculiarities of the pointed bullet that it is impossible to distinguish the effects of those which are normal from those which have been tampered with. It is possible that some have been tampered with. It is impossible that all have been tampered with. Yet the wounds are all acknowledged to be very severe. The inference is obvious. The increased severity of wounds inflicted by pointed bullets can be no surprise to any surgeon who has studied the ratiocinations of German military surgeons, based upon their experiments upon dead human, and living animal bodies. There is a large literature of such cases, and they all foreshadow the enhanced severity of wounds "in the next European War." For once the prophets have been right. If German surgeons had opportunities of studying the effects upon living bone and tissue of the pointed German bullet, as we English surgeons see them in the persons of our soldiers, I think we should hear less about Dumdum ammunition and wounds.

When the present bore was adopted in the modern military rifle (i.e., from six to eight millimetres) it was soon found that with the old blunt-nosed bullet there was loss of wounding power. Insignificant wounds were made in soft parts; bone, even compact bone, was merely tunnelled. The "stopping effect" on wild animals was found to be insufficient. And it was evident that the loss of wounding power was due to the small striking area of impact of the bullet. To increase wounding power without losing any of the good military qualities of the small-bore bullet was the problem, and it was solved in many ways. The many varieties of the expanding bullet, of which the Dumdum is only one, were devised to meet the difficulty, and so effectively did so that their use was ruled out of civilized warfare. The inventors of the pointed or turning bullet achieved the same end by utilizing another peculiarity of the long small-bore missile, its instability on impact. But the principle at the bottom of its increased wounding power was exactly the same. The bullet increased its striking area on impact. As Professor Kirschener points out, the centre of gravity of the bullet, the point about which it would rotate in its flight (if not steadied by rotation round its long axis) is

situated very far back. The gyroscopic effect of the rotation on its long axis, imparted by the rifling of the barrel, tends to keep the long axis of the bullet in the line of the trajectory, but not quite successfully. There is always a slight movement, probably roughly circular, of the bullet tip. But the effect of even the slightest deflection of the tip on impact is at once to produce a movement of rotation round the short axis of the bullet. Even at short ranges the effect has been observed, and even when the bullet is fired through quite thin sheets of cardboard. All these facts have been well known to military surgeons for some years past, and, as I have said above, confident anticipations of increased severity in wounds were expressed. We have probably gone back to the severe type of wound inflicted at short ranges by the large leaden bullets of the Brown Bess days. Only we now have them at vastly increased ranges, and therefore in vastly increased numbers. And incidentally, as large skin openings are invariably associated with sepsis, we have gone back to all the Peninsular varieties of sepsis.

My point then is that the acknowledged effects of the turning bullet are severe enough to be by many surgeons put down to some forbidden form of expanding bullet. So that whether the so-called Dumdum bullet has or has not been used, may be a point of interest to the international jurist, but will not make much difference to the labours of the surgeon in a campaign where the turning bullet is being used. And I will only add that the nation which first introduced the pointed bullet is responsible for thus turning the flank of an international agreement, as it is obvious that its example must necessarily and in self-defence be followed by all the other nations.

Professor Stargardt's paper shows more animus and less fairness of presentment and deduction (I regret to use these phrases) than Professor Kirschener's. No doubt his feelings were deeply stirred by the severity of the wounds he saw, and in this he has our full sympathy, as we too are daily seeing "severe, indeed to some extent absolutely abominable, wounds" inflicted by the pointed German bullet. But in the first place he writes as if all the wounds he saw were of the very severe nature he describes, and in the second case he desires his readers to believe that the English infantry bullet is intended to break up on bone and is deliberately constructed to that end. As regards the first point, while only the severest cases would naturally come before a surgeon of his eminence, it is hard to believe that his experience was limited to wounds in which the bullet broke up. Indeed he speaks of some wounds with bullets in them which were merely deformed, and I think a reperusal of his notes and skiagrams must show some in which no bullet at all appears. This presumption, if it is justified, would level up Professor Stargardt's experience with that of English military surgeons. We too in some wounds have noted immense and unwonted destruction of bone and soft parts, we too have found the surrounding tissues filled with

minute fragments of disintegrated bullets, we too have observed that the pointed bullet, speaking generally, causes injuries more severe than the older blunt-pointed bullet, but to those of us with any experience of gunshot injuries, these results were not wholly unexpected, and can be explained by the use of a type of missile which as a nation we were not the first to introduce.

As regards the second point, the following explanation may satisfy small-arm experts, though I am afraid it will never convince Professor Stargardt. The object of placing the lighter metal of the core near the tip of the bullet is that the tip shall be considerably lighter than the base, and consequently that the centre of gravity of the whole bullet shall be near the base. This fact makes the tendency to turn on impact considerably more marked than if the whole core were of one metal.

Professor Stargardt's very interesting comparison between the French and English bullets as regards their respective wounding powers serves to emphasize the above point. The French bullet is longer and heavier than the English, and while it is pointed at the top it is also somewhat diminished towards the base. Its centre of gravity is therefore somewhat further forward relatively and it is probable that its tendency to turn is correspondingly diminished. When it does turn I expect its greater length and weight to give it a remarkable wounding power, but the majority of wounds inflicted by it would be less severe than those due to the English bullet.

Current Literature.

Bacteriological Notes on "Gas Gangrene," by M. Weinberg and P. Séguin.—The authors have already pointed out the important rôle played by the *Bacillus perfringens* in producing the gas gangrene which so often occurs in wounds in war. But the *B. perfringens* is not the only microbe met with in this condition; for example the bacillus of malignant œdema (*Vibrion septique*) and other organisms to be described in this paper may be present. There are also different strains of the *B. perfringens*.

(1) *B. perfringens* in a twenty-four hours culture in glucose broth is usually short and stumpy with square or slightly rounded ends; sometimes the rods are longer and may in certain strains be slightly curved.

The authors have never seen spores even in six months old cultures in albumen broth in any of the strains of the *B. perfringens* they have isolated, nor have they ever seen spores in the tissues of guinea-pigs inoculated with the *B. perfringens*, and which have died several days after the injection.

Cultures in milk are generally characteristic; rapid coagulation in twenty-four hours, spongy clot, red, and with a little clear whey.

The *B. perfringens* inoculated into milk tubes aerobically does not always grow; it is better to withdraw the oxygen.

Some races decolorize litmus milk, but do not clot it for two or three days in the incubator. Finally, some races only clot milk after several passages in glucose broth.

The appearance of the cultures on glucose agar varies according to the particular sample. Most commonly the colonies are more or less regularly rounded or in the form of a heart. These colonies are whitish opaque, granular, and always with regular edges.

The authors have produced in guinea-pigs all the lesions observed in man in cases of gas gangrene.

Some strains of *B. perfringens* produce very interesting toxic lesions in guinea-pigs at some distance from the site of inoculation: in the axillary region of the same side or even of the side opposite one observes a gelatinous œdema in the exudation in which there are few or no bacilli; similar lesions have been noted by the authors in limbs amputated on account of gas gangrene. One may isolate from the same wound strains of the *B. perfringens* which vary greatly in their pathogenicity for the guinea-pig. In gangrenous wounds the presence of Gram staining non-motile bacilli is constant.

(2) Another microbe frequently met with in gangrenous wounds resembles the *B. perfringens* closely, but is not pathogenic for guinea-pigs. In cultures of this microbe, in albumen broth ten days old, some bacilli with a sub-terminal spore may be met with.

(3) Sometimes the authors met the *B. perfringens* in association with the bacilli of malignant œdema in the same wound. One of the authors has described a case in which the bacillus of malignant œdema was in pure culture in the serous fluid from the blebs and also in the blood of the patient. The authors describe also three other microbes differing from the *B. perfringens* and the bacillus of malignant œdema, and which they consider to be the occasional cause of gas gangrene. They give to these microbes the provisional names of A, B, and C.

Bacillus A.: This bacillus is the same size and possesses the same motility as the bacillus of malignant œdema. In glucose agar it produces much gas and shows colonies of a yellow colour, regular, transparent, rounded or heart-shaped; exactly similar to those described under the name of "cœur jaune." Spores are not seen either in culture or in animals. It coagulates milk after some days in the incubator.

The guinea-pig and the mouse are very susceptible to it, and are killed by a dose of one quarter of a cubic centimetre under the skin. This microbe is only slightly pathogenic to the rabbit, and the rat is immune. The lesions are similar to those produced by the bacillus of malignant œdema.

Bacilli B and C are similar in morphology but are longer and often curved, non-motile, and spore rapidly after undergoing granular degeneration; they kill a guinea-pig by intra-muscular injection and produce the typical lesions. The race B is much the more pathogenic; it kills a guinea-pig in a dose of one quarter of a cubic centimetre. It is also pathogenic for all the laboratory animals and possesses a very active soluble toxin.

These two microbes present characters very similar to the bacillus of malignant œdema; are they distinct species? It is proposed to settle this question by study and research with specific sera.

D. H.

Bacteriological Examination of Infected Wounds.—S. Costa and J. Troisier, in the *Comptes Rendus de la Société de Biologie*, June 11, 1915, give the results of bacteriological examination of infected wounds. In two cases microscopical examination completed by inoculation of aerobic and anaerobic culture tubes determined the presence in pure culture of the *B. perfringens*; the wounds in these cases healed up without odour or any complication.

In three cases in which gas gangrene was present, direct examination and culture proved the presence of the pneumococcus and the *B. perfringens*.

In two other cases which did not present grave symptoms of gas gangrene but exhaled a fetid odour, one proved to be due to a mixed infection of *B. perfringens* and the pneumococcus, the other to a mixed infection of the pneumococcus and bacillus of malignant œdema. Finally in three other cases, in which the wounds were lacerated and deep but without gas or odour, yet again the pneumococcus and *B. perfringens* were found.

The authors state that the *B. perfringens* when inoculated into guinea-pigs in pure culture is often innocuous, but when inoculated along with the pneumococcus gives rise to symptoms resembling those met with in cases of gas gangrene in man. D. H.

Capsulated Cocco-Bacillus Pathogenic for Man.—A. Besredka, in the *Comptes Rendus de la Société de Biologie*, June 11, 1915, describes a capsulated cocco-bacillus pathogenic for man. This bacillus, allied to the Pasteurella group, was met with in septic wounds in conjunction with the *B. perfringens* and the bacillus of malignant œdema.

In certain wounds, but rarely, the cocco-bacillus plays a predominant rôle.

The microbe in question, for which the author proposes the name *Cocco-bacillus verodunensis*, presents itself in the form of an oval cocco-bacillus, resembling the *B. pestis*, measuring about two microns in length and one micron broad, surrounded with a halo. When examined in the hanging drop it is actively motile.

It stains readily with all basic aniline dyes and shows bi-polar staining. It is not stained by Gram's method.

It grows well on all ordinary nutrient media, and is a facultative anaerobe, optimum temperature 37° C. On agar the growth resembles that of typhoid; it does not liquefy gelatine nor congregate milk, and is pathogenic for rabbits and guinea-pigs. D. H.

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JOURNAL OF THE ROYAL ARMY MEDICAL CORPS.

Corps News.

JANUARY, FEBRUARY AND MARCH, 1915.

EXTRACT FROM A DESPATCH FROM THE FIELD MARSHAL COMMANDING-IN-CHIEF THE BRITISH ARMY IN THE FIELD, PUBLISHED IN THE "LONDON GAZETTE" FEBRUARY 16, 1915:—

"Since the commencement of hostilities the work of the Royal Army Medical Corps has been carried out with untiring zeal, skill and devotion. Whether at the Front under conditions such as obtained during the fighting on the Aisne, when casualties were heavy and accommodation for their reception had to be improvised, or on the line of communications, where an average of some 11,000 patients have been daily under treatment, the organization of the Medical Services has always been equal to the demands made upon it.

"The careful system of sanitation introduced into the Army has, with the assistance of other measures, kept the troops free from any epidemic, in support of which it is to be noticed that since the commencement of the War some 500 cases only of enteric have occurred.

"The organization for the first time in war of Motor Ambulance Convoys is due to the initiative and organizing powers of Surgeon-General T. J. O'Donnell, D.S.O., ably assisted by Major P. Evans, Royal Army Medical Corps.

"Two of these convoys, composed entirely of Red Cross Society personnel, have done excellent work under the superintendence of Regular Medical Officers.

"Twelve hospital trains ply between the Front and the various bases. I have visited several of the trains when halted in stations, and have found them conducted with great comfort and efficiency.

"During the more recent phase of the campaign the creation of Rest Depôts at the Front has materially reduced the wastage of men to the line of communications.

"Since the latter part of October, 1914, the whole of the medical arrangements have been in the hands of Surgeon-General Sir A. T. Sloggett, C.M.G., K.H.S., under whom Surgeon-General T. P. Woodhouse and Surgeon-General T. J. O'Donnell have been responsible for the organization on the line of communications and at the Front respectively."

LETTER FROM GENERAL OFFICER COMMANDING 1st DIVISION.

A.D.M.S.

1st Division No. $\frac{134}{4}$ (G).

The Major-General Commanding the Division wishes to place on record his appreciation, which is shared by higher authorities, of the good work which has been done by all ranks of the Royal Army Medical Corps in the Division, throughout the last six weeks' operations.

The constant fighting has involved continual and arduous work for the Royal Army Medical Corps, both for those attached to units, for the Field Ambulances, and for the Administrative Staff. During and after the fighting on December 21 and 22, and on January 25, a large number of wounded were successfully dealt with; all the arrangements working expeditiously and smoothly.

Throughout a period of exceptionally unfavourable weather the work of the Royal Army Medical Corps in combating the results of exposure in the trenches has been equally well carried out.

Thanks to the efficient and sanitary manner in which the bathing and laundry establishments have been conducted by the Royal Army Medical Corps, the health and well being of the troops have materially improved.

The Major-General Commanding wishes to thank the A.D.M.S., the Commanders of Field Ambulances, and the Medical Officers attached to units, for the good results of their organization and work.

1st Division Headquarters,
February 12, 1915.

E. S. HOARE NAIRNE, *Lieutenant-Colonel,*
General Staff, 1st Division.

ARMY MEDICAL SERVICE.

Colonel Robert Porter is retained on the active list, under Article 120, Royal Warrant for Pay and Promotion, and to be supernumerary, dated January 31, 1915.

Colonel John C. Culling is retained on the active list under the provisions of Article 120, Royal Warrant for Pay and Promotion, 1913, and to be supernumerary, dated February 7, 1915.

Brevet-Colonel Frederick Smith, D.S.O., is retained on the active list under Article 120, Royal Warrant for Pay and Promotion, and to be supernumerary, dated February 8, 1915.

Colonel James M. Irwin, M.B., is retained on the active list under Article 120, Royal Warrant for Pay and Promotion, and to be supernumerary, dated February 13, 1915.

The undermentioned Colonels to be Surgeon-Generals:—

Dated March 1, 1914.—Menus W. O'Keefe, C.B., M.D.; Richard H. S. Sawyer, C.M.G., M.B.; John C. Culling; William G. Birrell, M.B.; Francis J. Jencken, M.B.; Francis H. Treherne, C.M.G.

The undermentioned Lieutenant-Colonels, from Royal Army Medical Corps, to be Colonels:—

Dated March 1, 1914.—Robert L. R. Macleod, M.B.; Gofton G. Adams; James M. F. Shine, M.D.; Nicholas C. Ferguson, C.M.G., M.B.; Gerald Cree, C.B.; Samuel C. Philson; Sydney G. Allen; Philip C. H. Gordon; Llewellyn T. M. Nash, C.M.G.; James H. Daly; Henry D. Rowan, M.B.; Howard Carr, M.D.; Thomas Daly; Michael J. Sexton, M.D.; Herbert E. Cree; William H. Starr; Alexander A. Sutton, D.S.O.; Michael T. Yarr, F.R.C.S.I.; Charles H. Melville, M.B.; James B. Wilson, M.D.; Frederick W. G. Gordon-Hall, M.B.; Henry M. Adamson, M.B.; Tudor G. Lavie; Charles H. Burtchaell, C.M.G., M.B.; John J. Gerrard, M.B.; John S. Davidson, M.B.; James Fallon; Charles J. MacDonald, M.D.; Robert W. Wright, M.B.; Edwin Eckersley, M.B.; Denis M. O'Callaghan; George H. Barefoot, C.M.G.; Foster R. Newland, M.B.; Reginald J. Windle, M.B.; John J. Russell, M.B.; Thomas du B. Whaite, M.B.; Henry T. Knaggs, M.B.; Richard H. Penton, D.S.O.; Frederick J. Morgan; Brevet-Colonel William H. Horrocks, M.B., K.H.S.; Charles H. Hale, D.S.O.; Hugh C. Thurston, C.M.G.; Bertal H. Scott; Oliver R. A. Julian, C.M.G.; Eustace A. Burnside; Stuart Macdonald, M.B.; Brevet-Colonel Maurice P. C. Holt, D.S.O.; William L. Gray, M.B.; Edward G. Browne; James C. Morgan; Herbert I. Pocock; Charles R. Elliott, M.D.; Charles A. Young; John W. Bullen, M.B.; Benjamin J. Inniss; Stephen F. Clark; Edward M. Hassard; Sir William B. Leishman, Kt., C.B., F.R.S., M.B., F.R.C.P., K.H.P.; James Thomson, M.B.; Gerald T. Rawnsley; Alfred P. Blenkinsop; John Girvin; Brevet-Colonel Anthony John Luther; William Hallaran; Samuel G. Moores; Thomas B. Beach; Coryndon W. R. Healey; John H. E. Austin; William T. Mould; Alfred W. Bewley; Robert J. Copeland, M.B.

ROYAL ARMY MEDICAL CORPS.

Dated December 31, 1914.—Lieutenant-Colonel John Donaldson to be placed on retired pay.

The undermentioned Majors to be Lieutenant-Colonels:—

Dated December 31, 1914.—Edward W. Slayter, M.B.

Dated February 8, 1915.—Hugh S. Thurston.

Dated February 22, 1915.—Lancelot P. More.

Dated March 1, 1915.—Theophilus P. Jones, M.B.; Albert G. Thompson, M.B.; George A. Moore, M.D.; Richard C. Lewis; Henry W. H. O'Reilly, M.B.; Edgar H. Condon, M.B.; Harold W. K. Read; Frederick M. Mangin; Charles E. Pollock; William J. Taylor, M.B.; Bell W. Longhurst; Forberd R. Buswell; Frank A. Symons, D.S.O., M.B.; Charles T. Samman; Thomas H. J. C. Goodwin, D.S.O.; Alfred E. C. Kehle; Denis J. Collins, M.D.; John B. Anderson; James R. McMunn; Harold V. Prynnne, F.R.C.S.; Alfred E. Master, M.B.; George Dansey-Browning; Ernest S. Clark, M.B.; Kennet B. Barnett, M.B.; Arthur C. Fox, D.S.O.; Sebert F. St. D. Green, M.D.; Michael Boyle, M.B.; Percy Evans, M.B.; Claude K. Morgan, M.B.; George St. C. Thom, M.B.; John P. Silver, M.B.; Brevet Lieutenant-Colonel William S. Harrison, M.B.; Harry A. L. Howell; Douglas Lawson; Charles W. Profeit, M.B.; Frederick Kiddle, M.B.; Henry E. Staddon; Samuel J. C. P. Perry, F.R.C.S.I.; Lionel F. Smith, M.B.; Robert J. Blackham, C.I.E., and to remain seconded; Henry W. Grattan; John Grech; St. John B. Killery; Septimus H. Fairrie, M.B.; George T. K. Maurice, C.M.G.; Francis E. Gunter, M.B.; John H. Campbell, D.S.O.; John V. Forrest, M.B.; John C. B. Statham; Edwin C. Hayes; Edwin T. F. Birrell, C.M.G., M.B.; Brevet Lieutenant-Colonel Ernest W. Bliss; Percy J. Probyn, D.S.O., M.B.; Brevet Lieutenant-Colonel Arthur W. Hooper, D.S.O.; Anthony H. Waring; Edward W. W. Cochrane, M.B.; Arthur H. Morris; Samuel A. Archer; Robert W. Clements, M.B.; Alexander J. MacDougall, M.B.; Maurice Swabey; George B. Riddick; Henry Hewetson; George E. F. Stammers; Charles F. Wanhill; Wilfrid E. Hudleston; Martin P. Corkery; Leonard Addams-Williams; Malcolm MacG. Rattray, M.B.; Thomas H. M. Clarke, C.M.G., D.S.O., M.B.; Edwin W. P. V. Marriott; Stevenson L. Cummins, M.D.; Peter Mackessack, M.B.; Henry L. W. Norrington, D.S.O.; John McD. McCarthy, M.B.; John Poe, M.B.; Hamilton G. F. Stallard; Ernest Brodribb; Arthur W. N. Bowen; William H. S. Nickerson, V.C., M.B.; Hubert O. B. Browne Mason; Frederick S. Penny, M.B.; Brian Watts; Henry G. Martin; Frederick F. Carroll, M.B., and to remain seconded; John D. G. Macpherson, M.B.; William P. Gwynn; Standish de C. O'Grady, M.B.; Augustus H. O. Young; Ernest A. Bourke; Montagu M. Lowsley; Norman H. Ross, M.B.; Edgar T. Inkson, V.C.; Percy H. Collingwood; Charles J. O'Gorman, D.S.O.; Robert S. H. Fuhr, D.S.O.; Harold P. W. Barrow; David Harvey, M.D.; George J. S. Archer, M.B.; Sydney O. Hall; Alfred E. Weld; James S. Gallie; Francis J. C. Heffernan, F.R.C.S.I.; Henry Herrick; James Cowan, M.B.; Austin R. O'Flaherty; Henry B. G. Walton; George B. Crisp; Cecil W. Mainprise; Alec L. Scott; Gerald H. Goddard; John E. Hodgson; Brevet Lieutenant-Colonel Matthew H. G. Fell; William B. Winkfield; Jones W. Leake; John W. H. Houghton, M.B.; George M. Goldsmith, M.B.; Richard H. Lloyd; Brevet Lieutenant-Colonel John M. Sloan, D.S.O., M.B.; Harry D. Packer; Lawrence Humphry; Frank Ashe; James G. Gill; Thomas C. Lauder, M.B.; Duncan E. Curme; Herbert S. Taylor; Francis J. Brakenridge; Edmund P. Hewitt; Nathaniel J. C. Rutherford, D.S.O., M.B.; Gilbert J. A. Ormsby, D.S.O., M.D.; Horace K. Palmer; Francis J. Palmer; Vincent J. Crawford, D.S.O.; Arthur L. A. Webb; Brevet Lieutenant-Colonel Howard Ensor, D.S.O., M.B.; Robert A. Cunningham, M.B.; George G. Delap, D.S.O.; Harold Simson; William R. Blackwell; Henry M. Nicholls, M.B.; Arthur Chopping; Sydney G. Butler, D.S.O.; John J. W. Prescott, D.S.O.; Arthur O. B. Wroughton; Percy H. Falkner, F.R.C.S.I.; Henry E. M. Douglas, V.C., D.S.O.; Ernest E. Ellery; James W. Langstaff; Leonard Wood; Harold B. Fawcus, M.B.; Evelyn P. Sewell, M.B.; Lawrence W. Harrison, D.S.O., M.B.; Hugh M. Morton, M.B.; Marcus H. Babington; Horace S. Roch; Frederic Harvey; Henry C. R. Hime, M.B.; Charles C. Cumming, M.B.; Charles R. Evans, D.S.O.; Harold H. Norman, M.B.; William A. Woodside; Littleton F. F. Winslow; Otto W. A. Elsner; Arthur A. Seeds, M.D.; Henry S. Anderson; Langford N. Lloyd, D.S.O.; Thomas C. Mackenzie, D.S.O.; Edward P. Connolly; James H. R. Bond.

Lieutenant-Colonel Alfred Blenkinsop, on appointment as Assistant Director-General, Army Medical Service, to be supernumerary, dated October 29, 1914.

Lieutenant-Colonel Herbert J. M. Buist, D.S.O., M.B., to be local Colonel, whilst serving in South Africa, dated January 1, 1915.

The undermentioned Captains to be Majors:—

Dated January 31, 1915.—Albert E. B. Wood, M.B.; James B. Meldon, M.B.; Charles Bramhall; Henry T. Stack, M.B.

Dated February 17, 1915.—Captain George E. Miles.

Lieutenant-Colonel William E. Berryman is retained on the active list under Article 120, Royal Warrant for Pay and Promotion, and to be supernumerary, dated February 22, 1915.

Major John M. Buist, M.B., is placed temporarily on the half-pay list on account of ill-health, dated February 6, 1915.

Supernumerary Major Dudley S. Skelton is restored to the establishment, dated March 5, 1915.

The undermentioned Quartermasters and Honorary Captains to be Honorary Majors:—

Dated February 3, 1915.—Edward Pegden Offord, R.A.M.C.; Henry Joseph Francis Audus, R.A.M.C.

Dated March 17, 1915.—Henry William Glover; Alexander Wilson,

Quartermaster and Honorary Major John Bartholomew Short is retained on the active list under Article 120, Royal Warrant for Pay and Promotion, and to be supernumerary, dated February 13, 1915.

The undermentioned to be temporary Quartermasters, with the honorary rank of Lieutenant:—

Dated February 1, 1915.—William John Dudman; Thomas Alfred Crichton.

Dated February 3, 1915.—John Medland Rapson.

Dated February 15, 1915.—William Henry Akehurst.

Dated February 25, 1915.—James MacLaren.

Dated March 1, 1915.—Alfred Fowler.

The undermentioned Serjeant-Majors to be Quartermasters, with the honorary rank of Lieutenant:—

Dated February 6, 1915.—Alexander William Grant; Richard Cox; Edwin Bennett; Joseph David Genese; George Abel Collier; Alexander James Fitch; Arthur George Audus; Charles John Yeates; Arthur Thomas Hasler; Walter John Tite.

Dated February 21, 1915.—James Francis Hughes; John Banks; Robert Joseph Fleming; William Hugh Storey; Fred Davis; George William Carnell; Harry Benjamin Lee; Thomas Edward Coggon; Henry John Polhill; Arthur Bennett; William Paul Conolly; Edward Haynes; Robert Spencer; William Cox; Charles Ward.

The undermentioned to be temporary Captains:—

Dated January 21, 1915.—John Curtis Webb, M.B.

Dated January 23, 1915.—John Joseph Esmonde.

Dated February 5, 1915.—Laurence MacLagan Wedderburn, M.D.

Dated February 15, 1915.—Arthur Corrie Keep, M.D.

Dated February 17, 1915.—Harold Albert Kisch, M.B., F.R.C.S.

Dated February 24, 1915.—Lieutenant John Francis O'Malley, F.R.C.S.; Lieutenant Lanyon Edward Owen.

Dated February 27, 1915.—Bertie Burnett Ham, M.D.

Dated February 16, 1915.—George Stoker.

The undermentioned to be temporary Lieutenants:—

Dated December 1, 1914.—William Bradshaw Davy; John Ferguson Hutton, M.B.

Dated January 16, 1915.—Dominic Francis Curran; John Hastings Glover, M.B.; William Pritchard-Airey; James Morrison, M.B.

Dated January 18, 1915.—Herbert William Fankhausen, M.B.; James Churchill Dunn, M.D.; Wilfred Conrad Stanley Wood; Donald Watson, M.B.; Fergus Hay Young, M.B.; George Allan Maling, M.B.; Stanislaus Reader; Walter Netherwood Rishworth, M.B.; Leonard Andersen Pearce Burt, M.B.; Samuel Ridley Mackenzie, M.D.

Dated January 20, 1915.—Charles Patrick Valentine MacCormack; Archer Ryland, F.R.C.S.Edin.; Charles James Glasson, M.D.; James Ninian George William McMorris; Henry William Doll.

Dated January 21, 1915.—James Tate, M.B.; Frank Llewellyn Gill, M.B.; William Alfred Taylor, M.B.; Charles Birch; Arthur William Hunter Donaldson, M.B.; Henry Sydney Colchester Hooper; John Frederick Venables, M.B.; Edward Benjamin Sunderland; Clive Watney Roe; Frank Cyril Greig; John Phillips Blockley, M.B.; Desmond William Beamish; William Leslie, M.B.; Robert Walpole

Murphy, M.D.; James Parker; Arthur Poole, M.B.; Gerald Robinson; Cyril Carlyle Beatty; Patrick Steele, M.D.; William Armour Brown, M.B.; Reginald Hannay Fothergill, M.B.; Desmond Manus MacManus; Ulick Joseph Bourke; Horace Nathaniel Everard, M.D.

Dated January 22, 1915.—William Gerald Ridgway, F.R.C.S.I.; Robert Aikin Wright; James Hill, M.B.; Bevil Molesworth Collard; Thomas Joseph Redmound Maguire, M.B.; Harold Myrie Cory; Bertram Henry Barton, M.D.; George Flett Barr, M.B.

Dated January 23, 1915.—Norman Black, M.B.

Dated January 24, 1915.—Peter Hay MacDonald, M.B.

Dated January 25, 1915.—Alexander Fleming Wilkie Millar, M.B.; Thomas Henry Brown, M.B.; John Ellison; Charles Leslie Wigan, M.B.; John Charles Robb, M.B.; William Samuel Heron, M.B.; George McCallum, M.B.; Roger MacGrath, M.B.; Cedric Norman Vaisey; Leslie Alexander Drake, M.B.

Dated January 26, 1915.—Thomas Reginald Trounce; Martin Phillips Thomas; George Michael De Vines, M.B.; Henry Joseph Cotter; Thomas Small Goodwin, M.B.

Dated January 27, 1915.—John Stuart Prentice, M.B.; William John Alexander Bruce Wishart, M.B.

Dated January 28, 1915.—James Patrick Lavery; Walker Stewart Lindsay, M.B.; Josiah Russell Turner, M.B.; George Davidson, M.B.; George Theodore Cregan, M.B.

Dated January 29, 1915.—John Adam Gib Burton, M.B.

Dated January 30, 1915.—Alfred Castle Warren, M.D.; John Robert McGilvray, M.B.; Hubert Samuel Stockton, M.B.; Frank Reginald Featherstone; Charles de Chanval Pellier; Vivian Percival Foote; Delbert Evans, M.B.

Lieutenant Charles E. Reckitt relinquishes his temporary commission, dated February 1, 1915.

Dated February 1, 1915.—Frederick Patrick Walsh; Geoffrey Fildes, M.B.; Henry Wardel Snarey Wright; Edmund Claud Malden; William Kenneth Armstrong Richards; Charles Roche; John Wesley Gilbert; Sidney Howard Browning; Kenneth Playfair; James Henry Bampton, M.B.; Frederick Rosenberg Harris; Thomas Arnold Watson, M.D.; Thomas Louis Enright; Henry Holman Weekes, M.D.; John Warnock Bingham, M.B.; Arthur Harold Wilson; Arthur Geoffrey Pattison Hardwick; William Joseph Burns Selkirk, M.D.; Robert Murray Fraser; John Reid Forde, M.B.; Frank Sholl Scott, M.B.; Herbert Temple Lukyn-Williams, M.B.; William Deanburn Dunlop, M.B.; Thomas Howard Frederick Roberts; David Wilson, M.B.; George William Blomfield James, M.D.; Francis Joseph Henry, M.B., F.R.C.S. Edin.; Charles O'Brien, M.D.; Kenneth Duncan Cameron Macrae, M.B.; Bernard Rayne Parmiter, M.B.; James Wilfred McKinney, M.B.; Ernest Tawse, M.B.; James David Forrester, M.B.; Graham Smith; John Perrin Brown, M.B.; Arthur Robertson Wightman, M.B.; Reginald Arthur Morrell; Harold Axel Haig, M.B.; Norman Duggan, M.B., F.R.C.S.; Sidney Bertram Radley, M.B., F.R.C.S.; Douglas Erith Derry, M.B.; Lomond Charles Dillon-Kelly; Cecil Francis Dillon-Kelly; Eugene Patrick Leahy, M.B.; Francis Percival Halkyard, M.B.; Robert Tindall, M.B.; Thomas MacKnight Watt, M.B.; Robert Henry Liscombe, M.B.; Frank Lee Cleland, M.B.; Archibald Fullerton, M.B.; Ernest Eugene Herga; William Anderson Coats, M.B.; Theodore Essex Roberts; Richard Robins Armstrong, M.B.; Alexander Nelson Craig, M.B.; John Anthony Freeman Hatch.

Dated February 2, 1915.—Malcolm Gross; Arthur Wandesford Comber; William Anderson, M.B., F.R.C.S. Edin.; George Alexander Shiel.

Dated February 3, 1915.—Adrian St. Johnston; Duncan Metcalfe Morison, M.B.; Matthew Hamilton Fleming.

Dated February 4, 1915.—Claude Emery Freeman; Herbert Smith, M.B.; William Barwise Sanders, M.B.; David John Jones, M.B.; Charles Herbert Gouldsmith Prance.

Dated February 5, 1915.—Horace James Gater; Franke Chamberlain Hart-Smith, M.B., F.R.C.S.; George Galen Bartholomew, M.B.

Dated February 6, 1915.—Walter Randall Knightley; Philip Maynard Heath, F.R.C.S.; Sydney Boyd Faulkner, M.B.; Archibald Hamilton Jacob; Henry Beveridge Smith, M.B.; Joseph Caton-Shelmerdine; Edward Longueville Mansel, M.D.; Harold Charles Harrison; Alfred Edward Seller; Sidney Wilkinson; Ronald Martin Wormald; Donald Clewer.

Dated February 7, 1915.—Harold William Wilson, M.B.; Thomas Pearson Herriot, M.B.; Archibald Cowe, M.B.; John Edgar Davies; John Campbell Neil, M.B.; John

Kelly; William MacLeod; Francis Edgar Sprawson; Oliver Beakley Pratt; Tom Watson Wadsworth, M.D.; Edward Henry Fennessy, M.B.; Stanley Thorpe Lewis, M.B.; Drevor Frederick Acton Neilson; Leonard Hankinson Terry.

Dated February 8, 1915.—William Henry Croly; Thomas Edwin Hammond, F.R.C.S.; Griffith Llywelyn Jones; Percy Lytton Tempest Bennett; John Hamilton Boag, M.B.; Charles George Gordon Keane; William Francis MacAlevey; Kenneth Montague Nelson; Arthur Henry Towers, M.B.; Henry Strawson Turner; Philip Pennefather Warren; Patrick William White, M.B.; Arthur James Bruce Lockie, M.D.; Hugh Gwilym Morris, M.B.; Maxwell Ramsay, M.B.

Dated February 9, 1915.—Charles Rowley Nicholson.

Dated February 10, 1915.—Abram Leach, M.B.; Andrew Richmond Douglas, M.B.; Francis Percy Evers, M.B.; Arthur Loudoun Taylor, M.B.; William Campbell, M.B.; Joseph Marmion; Laurence Unthank Geraty; George Leggat, M.B.; Christopher Robson Dudgeon; Frank Hamersley Woods; Llewellyn McIntyre Weeks, M.B.; John Macintyre, M.B.; Harold Esmond Arnison Boldero; Cedric Sydney Lane Roberts; Henry Albert Gillespie, M.B.; Henry Carson Duffy, M.B.; Lennox Ross Broster, M.B.; James Patrick Fitzpatrick; Louis Thomas Eden, M.B.; Eric Stewart Marshall; James Ingram Pirie Wilson, M.D., F.R.C.S. Edin.; Henry George Frean, M.B., F.R.C.S. Cantab.; Patrick Ashe; Coningsby Leslie Colbran; Frederick Andre Mills, M.B.; William Tregonwell Collier; Claude William Scott Saberton, M.D.

Dated February 11, 1915.—Wallace Charles George Ashdowne, F.R.C.S.

Dated February 12, 1915.—John Telfer Smeall, M.B.; Edward Brice Cooper Mayrs, M.B.; John Joseph Dunne.

Dated February 13, 1915.—Harold Arthur Rowell; Ifan Septimus James.

Dated February 14, 1915.—Richard Desmond Fitzgerald, M.B.; Louis Laurence McKeever; Augustine Sargood Fry, M.B.

Dated February 15, 1915.—Reginald Lionel Ernest Downer, M.D.; Henry Williams Beresford Danaher; Edward Samuel Gooddy, F.R.C.S.; Harold Denny Duke; Carl Frederick Anthonisz; Charles William Donald, M.D., F.R.C.S. Edin.; Burgess Barnett; John Harold Wrightson, M.B.; Henry Joseph Milligan, M.D.; William Richard George Hamilton, F.R.C.S.I.; Ninian Edward Miles Home-Hay, M.B.; David Carnegie Alexander, M.B.; Alexander Jamieson, M.B.; Ernest Cromwell Peake, M.B.; Harold Ackroyd, M.D.; Hugh Watson Fox; Charles Spencer Palmer; Sydney Gordon Tippet, M.B.; Arthur Ryland Chavasse, M.B.; George William Davis, M.D.; Frank Gravely; Gavin Muir, M.B.; Frank Gardyne Milne, M.B.; David Anderson Duncan Kennedy, M.B.; William Harold Butler; John Perry Walker, M.B.; Thomas Barrington McKee, M.B.; Meredith Milton Townsend; George Mahony Mayberry; Gerald Davenant Shann; Frederick Charles Barlow.

Dated February 16, 1915.—John Kirton, M.B.; Hadyn Peters; William Frank Morgan; Edward Johnson, M.B.; Robert Condy, M.B.; Ernest Bosdin Leech, M.D.; Ernest Wells Witham.

Dated February 17, 1915.—Bernard Wallace; Harold Ernest Gamlen, M.B.; Edward Leslie Horsburgh, M.D.; Thomas Twistington Higgins, M.B., F.R.C.S.

Dated February 18, 1915.—George Barbour Macgregor, M.B.; Thomas Lovett, M.B.; Samuel Constantine Westwood, M.D.; Alfred Merrin; Thomas Francis Griffin, M.D.; Matthew Arnold Swan, M.B.; Edward Shairp Barnard Fames; George Arthur Borthwick, M.B.; Horace Lloyd Mann; Wilkinson Overend, M.B.; Hubert Walter Ward; Maurice John Mottram; Donald Francis Shearer, M.B., F.R.C.S.; Alexander Lewis Grant, M.B.; John Fraser Steven, M.B.; Austin Charles Giles, M.B.

Dated February 19, 1915.—William Henry Anderson; John Ferguson, M.B.

Dated February 20, 1915.—Lawrence Henry Carr Birkbeck, M.B.; John Edward O'Loughlen; Thomas James Simpson Moffett, M.D.; Robert Charles Matson; Edwin Cecil Hardwicke; Hugh Atwood Beaver, M.B.; Charles Wilkinson Breeks, M.B.

Dated February 21, 1915.—John Humphrey James Victor Coats, M.B.

Dated February 22, 1915.—Stephen Walter Coffin; Leonard Graham Brown; George Henry Fullarton Graves; Gerald Schofield, M.D.; Percy East Lones.

The undermentioned to be temporary Lieutenants whilst serving with the Red Cross Hospital, Netley:—

Dated March 13, 1915.—Eric Lancelot Kingsley Sargent; Arthur Rawdon Carrington Doorly.

Temporary Captain Robert Stewart Rodger, M.B., to be temporary Major, dated February 27, 1915.

Thomas Guy Macaulay Hine, M.D., is granted temporarily the honorary rank of Captain, dated March 11, 1915.

WARRANT OFFICERS, NON-COMMISSIONED OFFICERS, AND MEN.

PROMOTIONS.

The following promotions, to complete Establishment, will take effect from the dates specified :—

To be Serjeant-Majors.

No.	Rank and Name	Date	Remarks
11685	Qmr.-Serjt. Cox, W.	11.7.14	Vice H. A. Ward to H.M. Commission.
10932	„ Ward, C.	25.7.14	„ T. Grenfell to H.M. Commission.
10929	„ Rossiter, E. H.	10.8.14	
11530	„ Starkie, J. T.	„	
11714	„ Kerstein, E.	„	
12202	„ Connolly, T.	„	
10188	„ Manwaring, R. E.	„	
10206	„ Enwright, J.	„	
12960	„ Willsher, J. W.	„	
12668	„ Sellex, G.	„	
10699	„ Connolly, B. D.	„	
11862	„ Rose, H. W.	„	
11214	„ Squire, W. E.	„	
11507	„ Baxter, D. C.	„	
11060	„ Janes, E.	„	
11724	„ Maxwell, J. H.	„	
11441	„ Sprinks, H.	„	
11603	„ Clegg, W.	„	
11173	„ Hazoll, C. J.	„	
10892	„ Reeve, H. J.	„	To complete War Establishment on mobilization.
11509	„ Earp, J. J.	„	
10434	„ Anderson, H. J.	„	
11144	„ McCreeth, A.	„	
12058	„ Pettley, A. W.	„	
11419	„ McClelland, J. H.	„	
10922	„ Robinson, H.	„	
11305	„ Ashton, R.	„	
12138	„ Steele, H.	„	
14008	„ Watt, D.	„	
10542	„ Mendel, A. E.	„	
11582	„ Ryan, J.	„	
14461	„ Baker, A.	„	
12932	„ Gordon, C.	„	
13856	„ McKay, R. J.	„	
16115	„ Dewberry, E. B.	„	
14290	„ Scott-Badcock, W. H.	„	
11250	„ Sage, J.	„	
14851	„ Willsher, C. B.	„	
14926	„ Hunt, W. H. G.	„	

To be Quartermaster-Serieants.

12023	Staff-Serjt.	Morris, S. C.	11.7.14	To complete War Establishment on mobilization.
12441	„	Hubbard, L.	„	
10912	„	McMahon, J. H.	25.7.14	
14464	„	Hurran, G. F.	10.8.14	

To be Quartermaster Serjeants—Continued.

No.	Rank and Name	Date	Remarks
11613	Staff-Sergt. Morris, G. R.	10.8.14	To complete War Establishment on mobilization.
15948	" Christie, G. D.	"	
14663	" Snow, P.	"	
11320	" Watts, R.	"	
12434	" Eallett, R. B.	"	
16177	" Robinson, A. F.	"	
16287	" Saunders, W. E.	"	
16573	" Nichol, R. S.	"	
15721	" Odell, A. E.	"	
11020	" Lavis, W.	"	
11761	" Walls, F. S.	"	
15619	" Preston, E.	"	
14705	" Muirhead, W. A.	"	
12410	" Coombs, R. B.	"	
14002	" Hughes, J.	"	
13027	" Cantrell, J. B.	"	
16473	" George, W.	"	
11528	" Bannister, J.	"	
15808	" Primer, C.	"	
17568	" Steele, E.	"	
12582	" Whiting, J.	"	
17260	" Payne, G. W.	"	
13892	" Dixon, H.	"	
18713	" Ellis, W. H.	"	
11728	" Jarvis, T. J.	"	
13338	" Boxshall, H. S.	"	
15670	" Goodread, F. W.	"	

To be Staff-Serjeants.

15983	Serjeant	Lister, C. E.	11.7.14	To complete War Establishment on mobilization.
17973	"	Knott, F.	"	
19046	"	Phillips, S. J.	24.7.14	
12537	"	Molloy, F.	25.7.14	
18718	"	Parr, W. H.	3.8.14	
14359	"	Thomas, J. G.	10.8.14	
18943	"	Thompson, H. L.	"	
12129	"	Barnes, S. H.	"	
18678	"	Ellis, L. S.	"	
18950	"	Musgrave, P. H.	"	
12583	"	Ebbs, H.	"	
18613	"	Grant, C. F.	"	
13664	"	Dunn, J. C.	"	
12926	"	Gordon, A. D.	"	
18801	"	Wolfe, G. H.	"	
16053	"	Gawthorne, S. M.	"	
18415	"	Bell, A.	"	
11807	"	Levey, J.	"	
11896	"	Spackman, A. P.	"	
15947	"	Dennis, T.	"	
14770	"	Buckner, A.	"	
16231	"	Mason, H. B.	"	
18985	"	Shaw, S.	"	
15544	"	Barnes, E. J.	"	
17633	"	Sproule, R.	"	
15843	"	Stokes, W.	"	
16205	"	Gregson, T.	"	

To be Staff-Serjeants—Continued.

No.	Rank and Name		Date	Remarks
16596	Serjeant	Attfield, E. ..	10.8.14	To complete War Establishment on mobilization.
14326	"	Morman, W. P. S. ..	"	
18453	"	Philbrook, F. A. ..	"	
17748	"	Dissent, C. H. ..	"	
13661	"	Le Page, P. J. ..	"	
18216	"	Leggett, R. G. ..	"	
18976	"	Robinson, E. G. ..	"	
18337	"	Leaker, C. ..	"	
18432	"	Pearce, G. F. ..	"	
18445	"	Crawley, J. E. ..	"	
17500	"	White, R. R. ..	"	
18239	"	Roland, R. F. ..	"	
17928	"	Toye, W. S. ..	"	
18385	"	Coupland, F. W. ..	"	
18645	"	Rouse, C. E. ..	"	
12461	"	Cook, P. F. ..	"	
19253	"	Wilson, C. ..	"	
18158	"	Pursey, G. P. ..	"	
15288	"	Prince, W. C. ..	"	
15591	"	Harris, J. ..	"	
15813	"	Heggie, A. V. ..	"	
18577	"	Read, F. L. ..	"	
18110	"	Gibson, R. W. ..	"	
18948	"	Moore, E. ..	"	
18391	"	Turner, E. C. ..	"	
15671	"	Cole, R. W. ..	"	
15483	"	Sharpe, E. ..	"	
17057	"	Ward, M. ..	"	
18129	"	Harlen, M. ..	"	
18969	"	Gray, E. ..	"	
13032	"	Kerr, T. ..	"	
17987	"	Botts, A. ..	"	
12987	"	Walter, B. ..	"	
12989	"	Barnes, E. G. W. ..	"	
16678	"	March, J. E. ..	"	
12779	"	Stubbs, G. ..	"	
11614	"	Howard, W. H. ..	"	
18222	"	Dady, A. ..	"	
14761	"	Robertson, W. ..	"	
12242	"	Luxton, A. J. ..	"	
10425	"	Tollafeld, A. ..	"	
17555	"	Kinder, M. ..	"	
13035	"	Chandler, G. V. ..	"	
17358	"	Ennor, C. ..	"	
12709	"	Ford, H. J. ..	"	
17091	"	Moore, J. ..	"	
19320	"	Ritchie, H. A. ..	"	
103	"	Steer, G. P. ..	"	
10360	"	Toms, C. J. ..	"	

To be Serjeants.

11015	Lce.-Serjt.	Phillips, W. E. ..	11.7.14	To complete War Establishment on mobilization.
45	"	Moffatt, T. J. ..	18.7.14	
19070	"	Siddall, H. ..	22.7.14	
15183	"	Dewhurst, C. ..	24.7.14	

To be Serjeants—Continued.

No.	Rank and Name		Date	Remarks
14850	Lee.-Serjt.	Mayman, T. G. ..	25.7.14	To complete War Establishment on Mobilization.
17501	"	Christie, J. ..	27.7.14	
17506	"	Blong, P. ..	3.8.14	
18199	"	Staff, A. H. ..	10.8.14	
18215	"	Dewey, W. W. ..	"	
18226	"	Bilbee, L. V. ..	"	
19223	"	Stafford, J. H. ..	"	
874	"	Johnson, F. A. ..	"	
19558	"	Lythgoe, T. ..	"	
11437	"	Deasley, J. W. ..	"	
18040	"	Tootill, W. ..	"	
18262	"	Clear, E. W. ..	"	
18259	"	Roden, W. T... ..	"	
18335	"	Woolway, W. J. ..	"	
18330	"	Mercer, J. N... ..	"	
18340	"	Rouse, J. ..	"	
12402	Corporal	Rondel, T. E. ..	"	
12618	"	Mayman, W. A. ..	"	
12474	"	Soper, W. ..	"	
17162	"	Rogers, T. ..	"	
18043	"	Eagar, R. ..	"	
18383	"	Hutchings, W. ..	"	
18418	"	Smith, G. ..	"	
18443	"	Harris, G. ..	"	
18447	"	Fakes, J. E. ..	"	
18490	"	Cooper, H. ..	"	
19652	"	Jofford, C. V... ..	"	
764	"	Boddy, R. ..	"	
391	"	Scorey, W. J... ..	"	
2046	"	Hammond, F. J. ..	"	
2847	"	Ogg, R. W. ..	"	
19543	"	Audus F. E. H. ..	"	
18507	"	Gorrie, W. A... ..	"	
18509	"	McFarland, J. ..	"	
18571	"	Pepper, F. T.	"	
18559	"	Rodgers, G. F. ..	"	
18621	"	Walton, A. J... ..	"	
14337	"	Sadler, G. ..	"	
17699	"	Morrell, C. ..	"	
18427	"	Barber, P. ..	"	
18893	"	Hazell, J. ..	"	
18627	"	Cockburn, B. ..	"	
18656	"	Maywood, H. G. ..	"	
18739	"	Bradford, R. C. ..	"	
18737	"	Stovold, W. T. ..	"	
18763	"	Smith, F. J. ..	"	
18821	"	Western, G. ..	"	
105	"	Newman, F. ..	"	
1856	"	Leaney, A. F... ..	"	
19007	"	Dare, J. R. ..	"	
19093	"	Lane, A. ..	"	
286	"	George, W. E. ..	"	
18409	"	Horsfield, F. M. ..	"	
19102	"	Hughes, H. C. ..	"	
18432	"	Heard, G. ..	"	
18855	"	Ellison, J. ..	"	
18854	"	Forge, C. D. ..	"	
18903	"	Male, A. ..	"	

To be Serjeants—Continued.

No.	Rank and Name		Date	Remarks
17319	Corporal	Hort, A. T.	10.8.14	To complete War Establishment on Mobilization.
19980	"	Loder, H. J.	"	
18929	"	Taylor, J. W.	"	
19082	"	Cooke, J.	"	
19282	"	Goldon, H.	"	
1848	"	Mack, C. A.	"	
1906	"	Eves, J. G.	"	
19747	"	Hyde, C. H.	"	
1620	"	Pegg, A. E.	"	
18898	"	Green, G. H.	"	
19079	"	Stoneham, E. G. ..	"	
19086	"	Wain, A.	"	
19193	"	Stebbing, W. M. ..	"	
18982	"	Newman, A.	"	
19272	"	Lee, W. J.	"	
19303	"	Green, R. T.	"	
1848	"	Martins, A. V.	"	
19863	"	Mattison, W. H. ..	"	
19844	"	Hort, F. E.	"	
2147	"	Hampson, W. C. ..	"	
4882	"	Summers, F. G. ..	"	
18675	"	Partridge, A. C. ..	"	
1094	"	Alloway, H. B.	"	
10977	"	Herbert, R.	"	
19468	"	Jack, G. D.	"	
19536	"	Reece, W. E.	"	

These promotions are subject to the conditions laid down in paragraph 24 Standing Orders for the Royal Army Medical Corps.

To be Serjeant-Major.

10900	Qmr.-Serjt.	Andrews, A. C. ..	10.8.14
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To be Corporals.

19882	Lce.-Corpl.	Arscott, E.	10.8.14	To complete War Establishment on Mobilization.
19883	"	Hamilton, G. J. ..	"	
2180	"	Rogers, T. W. G. ..	"	
19897	"	Freeman, V. H. ..	"	
19900	"	Banham, B.	"	
1359	"	Collier, W. N.	"	
1406	"	Newland, F. H. ..	"	
1825	"	Williams, A. G. ..	"	
672	"	Stevens, A.	"	
1118	"	Reeves, H. W.	"	
4895	"	Gill, W. H.	"	
12278	"	Hale, G. H.	"	
17818	"	Horsnell, J.	"	
18724	"	Hill, W.	"	
19684	"	Davis, G. S.	"	
19039	"	Emerson, J. T.	"	
19711	"	Horstead, S. L. ..	"	
19888	"	Pilgrim, A. T.	"	
5239	"	Stow, S. R.	"	

To be Corporals—Continued.

No.	Rank and Name	Date	Remarks
19901	Lce.-Corpl. Martin, W. H. ..	10.8.14	
19916	" Carroll, H. J. ..	"	
73	" Ellard, F. ..	"	
1051	" Davey, W. H. ..	"	
1974	" Ferguson, C. D. ..	"	
1919	" Vyse, F. H. ..	"	
911	" Clough, W. ..	"	
1302	" Jack, J. ..	"	
1344	" Shelley, W. C. ..	"	
1475	" Bamford, W. J. ..	"	
2106	" Macdonald, J. ..	"	
11848	" East, A. ..	"	
19594	" Holden, P. W. ..	"	
19917	" Cate, A. ..	"	
2102	" Catton, F. T. ..	"	
12047	" Eley, H. A. ..	"	
17517	" White, F. ..	"	
18907	" Blundell, W. J. ..	"	
19171	" Smith, W. A. ..	"	
19472	" Munson, C. E. ..	"	
19583	" Pickerden, T. ..	"	
19591	" Rolfe, P. L. ..	"	
19930	" Pickard, A. ..	"	
19938	" Wright, A. E. ..	"	
19946	" Hillier, H. J. ..	"	
19960	" Grizzell, R. J. ..	"	
19997	" Tilby, R. J. ..	"	
5	" Mellor, G. P. ..	"	To complete War Establishment on Mobilization.
17	" Berry, A. C. ..	"	
22	" Church, W. R. ..	"	
26	" Bax, F. ..	"	
29	" Hart, J. ..	"	
42	" Harding, D. G. ..	"	
6714	" Barnard, D. ..	"	
87	" Woodley, A. W. ..	"	
5582	" Fielder, A. G. ..	"	
88	" Robinson, S. ..	"	
94	" Price, D. W. ..	"	
95	" Thomas, A. G. W. ..	"	
109	" Emmment, A. G. ..	"	
113	" Powell, J. D. ..	"	
118	" Rogers, A. C. ..	"	
91	" Bates, R. ..	"	
132	" Dart, S. ..	"	
153	" Richardson, G. T. ..	"	
178	" Wilkinson, A. E. ..	"	
1342	" Davis, H. ..	"	
1569	" Farmer, G. L. ..	"	
4357	" Harding, T. H. ..	"	
186	" Fream, W. G. ..	"	
192	" Murray, J. ..	"	
193	" Truscott, H. P. ..	"	
196	" Kent, A. J. ..	"	
218	" Dale, L. A. ..	"	
223	" Peake, W. ..	"	
226	" Wilks, A. H. ..	"	
19167	" Stokes, H. E. ..	"	
249	" Scovell, A. H. ..	"	

To be Corporals—Continued.

No.	Rank and Name	Date	Remarks
264	Lce.-Corpl. Trout, A.	10.8.14	
276	" Baldwin, T. D.	"	
284	" Gregory, A. O.	"	
15696	" Page, W. A.	"	
296	" Wilson, F. G.	"	
305	" Hobbes, J. W.	"	
306	" Quelch, F. G.	"	
379	" Loveland, A. G.	"	
470	" Claridge, H. A.	"	
501	" Benson, O.	"	
530	" Adams, A.	"	
570	" Crooke, C. B.	"	
590	" Gilbert, F. C.	"	
585	" Webb, G. E. S.	"	
12382	" Kay, J. H.	"	
1112	" Sheehan, J.	"	
1970	" Brunt, W. J. G.	"	
6231	" Martin, P. J.	"	
6313	" Smith, H. G.	"	
7066	" McCarthy, F. B.	"	
16913	" Darby, J.	"	
19709	" Young, W. E.	"	
659	" Rousell, L. T.	"	
706	" Allan, R.	"	
719	" Winckworth, A.	"	
728	" Brooks, A. T.	"	
743	" Coles, F. C.	"	
521	" Triebwasser, G. O.	"	
750	" Woodward, W. A.	"	
809	" Rowland, T.	"	
835	" Jonathan, D. H.	"	
844	" Johnstone, B. D.	"	
4593	" Martin, P. G.	"	
955	" McKechnie, R.	"	
943	" Ball, A. H.	"	
954	" Hallett, H. C.	"	
7189	" Newell, E. F.	"	
961	" Smith, R. E.	"	
963	" Fairweather, R. E.	"	
990	" Tasker, S. E.	"	
992	" Killigrew, H.	"	
19409	" Hutchinson, A.	"	
1011	" Ross, H. O.	"	
1018	" Luker, H.	"	
1031	" Moon, H.	"	
1869	" Brason, R.	"	
1072	" French, H. A.	"	
1076	" Bowden, F. C.	"	
18512	" Walkden, J.	"	
19295	" Ferdinando, H.	"	
1141	" Dyson, H. A.	"	
12208	" Breakell, R.	"	
11425	" Smethurst, G. H.	"	
11693	" Twomey, J.	"	
10976	" Bryan, C. A.	"	
19000	" Ahern, D.	"	
13193	" McFadden, W.	"	
13212	" Brown, J.	"	
14453	" Hay, J.	"	

To complete War Establishment on Mobilization.

To be Corporals—Continued.

No.	Rank and Name		Date	Remarks
17146	Lce.-Corpl.	Trower, A. A...	10.8.14	To complete War Establishment on mobilization.
17997	"	Morgan, D. ..	"	
18274	"	Nixon, W. R...	"	
18302	"	Smith, W. ..	"	
18743	"	Worrard, H. ..	"	
18444	"	Hall, A. H. ..	"	
18828	"	Reading, J. L. ..	"	
19965	"	Reilly, J. ..	"	
19626	"	White, E. F. ..	"	
18948	"	Breeze, B. ..	"	
19370	"	Potter, T. H. ..	"	
18992	"	Brennan, R. J. ..	"	
19085	"	Vinton, C. J. ..	"	
19133	"	Dewhurst, J. C. ..	"	
19449	"	Charles, W. ..	"	
19384	"	Cowen, J. C. ..	"	
19570	"	Fisher, W. ..	"	
5442	Private	Woodward, A. E.	"	
5015		Beisley, R. J...	"	
5052		Jepp, J. W. ..	"	
5168		Gregory, H. ..	"	
7612		Lauraine, G. ..	"	
6398		Coad, R. H. ..	"	
7296		Percival, W. A. ..	"	
1190		Handasyde, S. ..	"	
1270		Marrable, F. G. ..	"	
1276		Cooper, H. ..	"	
1302		Jack, J. ..	"	
1336		Dovey, C. ..	"	
1644		Flavell, C. W. ..	"	
4353		Burrell, B. G. ..	"	
1360		Doyle, J. ..	"	
1369		Earle, B. L. ..	"	
1375		Shipton, H. ..	"	
1400		Bamber, E. ..	"	
1410		Pratt, J. R. ..	"	
1412		Palmer, W. T. ..	"	
1430		Perkins, W. T. ..	"	
1448		Moore, W. ..	"	
1456		Hird, E. F. ..	"	
1464		Fitzgerald, J...	"	
1498		Miller, E. ..	"	
1501		Thompson, F. ..	"	
1514		Harrod, S. W. ..	"	
1509		Warren, A. ..	"	
1539		Catlin F. G. ..	"	
1556		Calvert, N. B. ..	"	
1586		Titman, H. G. ..	"	
1587		Curnoe, W. G. ..	"	
1583		Elston, S. G. ..	"	
1584		Phillips, W. E. ..	"	
1598		Bryant, E. C...	"	
1591		Ince, J. ..	"	
1603		Dolan, B. ..	"	
1611		Hodson, P. ..	"	
1615		Paddison, J. R. ..	"	
1643		Mattock, F. H. ..	"	
1656		Chivers, A. H. ..	"	
1673		Mitchell, A. ..	"	

To be Corporals—Continued.

No.	Rank and Name		Date	Remarks
1688	Private	Drew, G. H. F. ..	10.8.14	To complete War Establishment on mobilization.
1682	"	Emery, H. L. ..	"	
1710	"	Hudson, J. R. ..	"	
1715	"	Rogers, H. G. ..	"	
1716	"	Duncombe, F. G. H. ..	"	
1734	"	Dixon, W. ..	"	
1740	"	Ardrey, A. H. ...	"	
1746	"	McLachlan, E. J. ..	"	
1751	"	Plaum, F. H. ..	"	
1764	"	Selden, H. W. ..	"	
1772	"	Butler, M. A. ...	"	
1785	"	Phillips, W. J. ..	"	
1799	"	Stowe, S. A. ..	"	
1798	"	Gilbert, R. R. ..	"	
1805	"	Geary, R. ..	"	
1808	"	McClay, W. J. ..	"	
1836	"	Edwards, W. J. ..	"	
6218	"	Cockerell, A. W. ..	"	
1837	"	Hopkins, C. ..	"	
1845	"	Cook, A. ..	"	
2221	"	Coleman, G. ..	"	
1855	"	Crowe, F. J. A. ..	"	
1861	"	Simmons, J. C. R. ..	"	
1866	"	Sugden, W. ..	"	
1884	"	Gaughan, E. S. ..	"	
1894	"	Benjafield, H. J. ..	"	
1906	"	Eames, A. T. ...	"	
1911	"	Turnbull, N. W. J. ..	"	
1939	"	Sawers, W. ..	"	
1936	"	Cartwright, G. F. ..	"	
1951	"	Money, F. J. R. ..	"	
1945	"	Chapman, A. ..	"	
1946	"	Jane, E. ..	"	
1969	"	Overton, G. W. ..	"	
1973	"	Elliott, W. ..	"	
1975	"	Hawkes, W. ..	"	
1972	"	Davidson, B. ..	"	
1962	"	Storton, G. ..	"	
1993	"	Passingham, E. G. ..	"	
2002	"	Craddock, G. ...	"	
2003	"	Fullbrook, E. R. ..	"	
1990	"	Parker, J. W. ...	"	
1998	"	Patrick, E. ..	"	
2006	"	Bray, J. E. ..	"	
2018	"	Taylor, W. ..	"	
2029	"	Robinson, F. ..	"	
2030	"	Tucker, G. H. ..	"	
2031	"	Huppler, N. ..	"	
2039	"	Tomson, H. ..	"	
2069	"	Wilby, H. ..	"	
2151	"	Church, A. W. ..	"	
2148	"	Ashcroft, J. ..	"	
2170	"	Tromans, W. B. ..	"	
2150	"	Fraser, E. G. ...	"	
2165	"	Hampton, C. ..	"	
2166	"	Mathias, W. T. ..	"	
2185	"	Jenkins, W. E. ..	"	
2187	"	Thomas, H. ..	"	
2189	"	Munden, J. W. F. ..	"	

To be Corporals—Continued.

No.	Rank and Name	Date	Remarks
5164	Private Dowding, A. J. ..	10.8.14	
2210	" Fletcher, W. ..	"	
2226	" Chatting, F. J. ..	"	
2259	" Wilson, S. W. ..	"	
2256	" Connors, F. T. ..	"	
2264	" Blake, W. T. H. ..	"	
2266	" Mills, T. S. ..	"	
2278	" Gillbee, J. ..	"	
2289	" Harris, H. P. ..	"	
2299	" Hall, E. ..	"	
4302	" Steer, H. ..	"	
4310	" Tomlyn, F. H. ..	"	
4312	" Edwards, H. ..	"	
4321	" Cruickshank, J. H. L. ..	"	
4330	" Morman, H. R. ..	"	
4343	" Parr, W. S. ..	"	
4356	" Woodman, R. ..	"	
4363	" La Roche, H. ..	"	
4384	" Turner, S. G. ..	"	
4389	" Dedow, P. F. ..	"	
4408	" Cherry, W. ..	"	
4406	" Sprinks, A. E. ..	"	
4451	" Davis, C. K. ..	"	
4443	" White, E. H. ..	"	
4473	" Buckeridge, G. ..	"	
4488	" Pretious, A. P. ..	"	
4539	" Bews, J. A. ..	"	
4523	" Winrow, J. ..	"	
4516	" Steer, A. ..	"	To complete War Establishment on mobilization.
4541	" Sims, J. R. ..	"	
4536	" Asbey, T. C. ..	"	
4547	" Lynn, G. A. ..	"	
4569	" Richardson, L. ..	"	
4562	" Wood, F. C. ..	"	
4621	" Bohanna, J. ..	"	
4643	" Lillywhite, P. ..	"	
4684	" McEnaney, J. ..	"	
4682	" Taylor, A. E. ..	"	
4727	" Conway, J. T. ..	"	
4724	" Davey, H. F. ..	"	
4728	" James, A. ..	"	
4738	" Dell, G. L. ..	"	
4763	" Watson, E. R. ..	"	
4803	" Deggin, W. ..	"	
4841	" Clarke, A. E. ..	"	
4870	" Poules, S. ..	"	
4863	" Haines, H. G. ..	"	
4879	" Barlow, C. W. ..	"	
4892	" Flint, B. W. ..	"	
4898	" Wicken, W. H. ..	"	
4917	" Chilcott, J. A. ..	"	
4935	" Andrews, W. ..	"	
4936	" Strange, H. E. ..	"	
4942	" McCombie, A. ..	"	
4945	" Forman, J. E. ..	"	
4946	" Hastings, A. ..	"	
4949	" Tuson, L. I. ..	"	
7407	" Rich, C. ..	"	

These promotions are subject to the conditions laid down in paragraph 24 Standing Orders for the Royal Army Medical Corps.

PROMOTIONS.

The following promotions to complete War Establishment on Mobilization will take effect from the dates specified:—

To be Quartermaster-Serjeants.

No.	Rank and Name		Date	Remarks
9957	Staff-Serjt.	Stroud, J.	20.8.14	From Col. Govt.
11272	"	Holmes, B.	"	
11779	"	Neenan, G.	"	
17273	"	Jones, W. H.	"	
13317	"	Wheeler, C. F.	"	
14503	"	Pottinger, G.	"	
17229	"	Hutchens, W.	"	
17933	"	Dean, D. E.	"	
18307	"	Barker, F. H.	"	
12340	"	Butler, T.	"	
11027	"	Masters, J. H.	"	
11370	"	Loveland, F.	"	
15437	"	Wilkinson, C. A.	"	
12653	"	Morrison, F. C.	"	
12259	"	Worswick, J.	"	
12058	"	Winton, E.	"	
11946	"	Gosling, E. J.	"	
15096	"	Pugh, J. E.	"	
14647	"	Court, F. G.	"	
18439	"	Leach, W. T.	"	
12285	"	Burton, C. A.	"	
12623	"	Rolfe, H. S.	"	
11565	"	Jones, J. H.	"	
16216	"	Robinson, J. W.	"	
16265	"	Simes, P. T.	"	
12155	"	McKay, A.	"	
17849	"	Blanks, C. C.	"	
11816	"	Shepherd, L. A.	"	
12025	"	Harrold, A. E.	"	
18912	"	Dawson, H.	"	
12352	"	Curtis, J. H.	"	
16264	"	Harper, W.	"	

To be Staff-Serjeants.

7196	Serjeant	Longman, W. F.	20.8.14	As High Class Cook.
10638	"	George, F.	"	From Army Reserve.
12065	"	McKnight, A. A. E.	"	
10385	"	Howe, F.	"	
10936	"	Lake, H. T.	"	Sup. with Col. Govt.
16272	"	Thain, H. J.	"	
8962	"	Canty, A. J.	"	
17301	"	Lane, E. A.	"	Sup. with T.F.
10898	"	Burke, A. J.	"	Sup. with Col. Govt.
10960	"	Harper, A. I.	"	
12260	"	Delamare, W. G.	"	
12944	"	Jackson, C.	"	Sup. with T.F.
14082	"	Prince, G.	"	
16048	"	Taylor, W. J.	"	
10400	"	Catley, T. F.	"	Sup. with Col. Govt.
16097	"	Bowen, E.	"	
10719	"	Hopwood, W. H.	"	
11700	"	Stroud, M.	"	

To be Staff-Serjeants—Continued.

No.	Rank and Name		Date	Remarks
11465	Serjeant	Lenton, H. G. ..	20.8.14	Sup. with Col. Govt.
10436	"	Evans, F.	"	
17381	"	Gray, A.	"	
16751	"	Leighton, J.	"	
15484	"	Jones, C.	"	
15312	"	Gillespie, G.	"	
17844	"	Clenshaw, W. A.	"	
16440	"	Kildea, R.	"	
14617	"	Aston, H.	"	
10884	"	Conboye, G.	"	
18324	"	Parker, D.	"	
10108	"	Hinde, W.	"	
17159	"	Jones, C.	"	
16524	"	Fandam, H.	"	
17576	"	Ireson, J. R.	"	
12589	"	Harris, A.	"	
13025	"	Bovey, F. C.	"	
12261	"	Green, J. E.	"	
11690	"	Sankey, S.	"	
15927	"	Bush, W.	"	
18253	"	Suter, J.	"	
18634	"	Galton, F. H.	"	
18850	"	Eagles, G. W.	"	
18576	"	Lamkin, W.	"	
18018	"	Phipps, F. G.	"	
17939	"	Kirby, P. A.	"	
18420	"	Saunderson, A. J.	"	Sup. with Col. Govt.
15776	"	Blackman, H. G.	"	
11789	"	Skinner, W.	"	
12617	"	Edwards, J. R.	"	
17210	"	James, C. E.	"	
11788	"	Macdonald, D.	"	Sup. with T.F. Sup. with E.A.
11577	"	Russell, D.	"	
14620	"	Gowers, S.	"	
11074	"	Daintree, A. J.	"	
16289	"	Hearn, C. G.	"	
10150	"	Mosby, G. D.	"	
17857	"	Macklen, A. E.	"	
15725	"	Eastwood, T.	"	
12506	"	O'Rourke, P. J.	"	

To be Serjeants.

17899	Corporal	Dyke, W. E. ..	10.8.14	As High Class Cook.
11117	Lce-Serjt.	Griffiths, W. ..	20.8.14	
17553	"	Morfitt, J. R. ..	"	As High Class Cook. As High Class Cook.
17628	"	Luscombe, T. ..	"	
15022	"	Woodward, F. ..	"	
17728	"	Hynes, T.	"	
12245	"	Penney, C. F. ..	"	
12594	"	Wright, W.	"	
17960	"	McGuire, T.	"	
18230	"	Winkley, F.	"	
18240	"	Johnson, W. B. T. ..	"	
11628	Corporal	Fullam, T. A. ..	"	
18939	"	French, J. E.	"	
13340	"	Sedgeley, W. J. ..	"	
10998	"	McGrath, J.	"	

To be Serjeants—Continued.

No.	Rank and Name		Date	Remarks
18957	Corporal	Smith, A. C.	20.8.14	
11382	"	Nunn, A.	"	As High Class Cook.
15861	"	Hindle, J.	"	
14671	"	Brunton, E. W.	"	As High Class Cook.
11822	"	Johnson, G. E.	"	
11895	"	Higgins, J.	"	As High Class Cook.
18083	"	Gleave, J.	"	As High Class Cook.
18155	"	Beadle, E. E.	"	
14956	"	Stangroom, E. J.	"	
18518	"	Darlington, J. W.	"	
18906	"	Whyatt, T. G.	"	
19563	"	Harrington, H.	"	
17965	"	Thompson, I. J. J.	"	
18061	"	Cairns, W.	"	
18380	"	Bodger, E.	"	
18808	"	Steels, W.	"	
16132	"	Miller, J. E.	"	
18312	"	Howitt, J.	"	
2235	"	Walkley, T.	"	
18859	"	Day, M.	"	
18958	"	Cousins, S. J.	"	
19023	"	Tarbot, A.	"	
19030	"	Mann, R. S.	"	
19037	"	Thomas, W. B.	"	
19305	"	Hanrahan, J.	"	
1305	"	Prince, H. H.	"	
19641	"	Hardie, W. M.	"	
19048	"	Black, J.	"	
19161	"	Parkinson, G.	"	
19160	"	Preston, C. J.	"	
19202	"	Baiden, F. J. R.	"	
19259	"	Burrows, A. W.	"	
19350	"	Barnes, C. J. W.	"	
756	"	Pateman, G.	"	
19827	"	Baxter, J. W.	"	
19478	"	Pollitt, A.	"	Sup. with Col. Govt.
19792	"	Baigent, H. A.	"	
16449	"	Sutherland, J.	"	
935	"	Griffith-Williams, H.M.	"	From Army Reserve.
754	"	Russell, H.	"	
1032	"	Mean, E.	"	
17208	"	Bailey, J.	"	
19607	"	Pottow, R. C.	"	
19547	"	Mansell, W. A.	"	
925	"	Lomas, C.	"	
1116	"	Lockwood, J. W.	"	
2083	"	Pearce, W. G.	"	
18736	"	Franklin, E. C.	"	
19433	"	Blake, H.	"	
19460	"	Payne, C. J. T.	"	
19453	"	Wingate, A. C.	"	
19469	"	Purnell, H. D.	"	
19496	"	Pettit, H.	"	
19515	"	Salter, G. D.	"	
24	"	Haynes, P. H.	"	
19913	"	Roberts, T. S.	"	
19401	"	Harland, A. E.	"	
19620	"	Carter, W. J.	"	

To be Serjeants—Continued.

No.	Rank and Name		Date	Remarks
19660	Corporal	Webb, A. J. . . .	20.8.14	
18251	"	Ovendon, E. E. . .	"	
19688	"	Falkingham, T. V. .	"	
19742	"	Cannon, F. G. . .	"	
19744	"	Simmons, R. W. . .	"	
19802	"	Leakey, A. . . .	"	
19814	"	Crocker, A. G. . .	"	
19821	"	Young, B. L. . . .	"	
184	"	Dodd, I. B. . . .	"	
1866	"	Browne, E. B. . .	"	
1757	"	Marshall, W. J. . .	"	
17230	"	Mann, J. . . .	"	

To be Corporals.

11472	Lce.-Corpl.	Wright, W. . . .	10.8.14	
12691	"	Ahern, W. . . .	"	
16444	"	Stubington, G. . .	"	
17317	"	Reynolds, J. C. . .	"	
17997	"	Morgan, D. . . .	"	
18288	"	Wheeler, C. . . .	"	
18280	"	Golden, F. . . .	"	
18295	"	Auckland, G. . . .	"	
18833	"	Crook, R. . . .	"	
18600	"	Grimsdall, A. . . .	"	From Army Reserve.
18741	"	Fernie, S. D. . . .	"	
18966	"	Whitney, A. E. . .	"	
19240	"	Seasbrook, T. C. S.	"	
19386	"	Game, H. E. . . .	"	
19444	"	Jones, H. A. . . .	"	
19640	"	Hollands, G. H. . .	"	
19673	"	Folwell, F. C. W. .	"	
19687	"	Dallagana, A. C. . .	"	
247	"	O'Callaghan, J. J. .	"	
19851	"	Claydon, P. E. . .	"	
19979	"	Thain, G. E. . . .	"	
17942	"	Taylor, J. W. . . .	"	
18231	"	Barden, J. . . .	"	
18498	"	Ross, E. R. . . .	"	
19279	"	Mars, H. E. . . .	"	
19276	"	Young, J. J. . . .	"	
18755	"	Mackenzie, A. . . .	"	
18494	"	Major, J. L. . . .	20.8.14	
18181	Private	Baker, W. A. . . .	"	
19989	"	Finley, A. . . .	"	
21	"	Keech, T. . . .	"	
1472	"	Ribbons, E. D. . .	"	
1483	"	Licence, C. . . .	"	
2010	"	Merriman, P. . . .	"	
4383	"	Davies, J. T. . . .	"	
18136	"	Day, H. . . .	"	
18342	"	Morris, J. . . .	"	
18587	"	Leeming, C. . . .	"	
18690	"	Parkins, A. E. . .	"	
18974	"	Paul, R. . . .	"	From Army Reserve.
19073	"	Leach, E. W. . . .	"	
19237	"	Naylor, W. . . .	"	
19283	"	Meagher, E. . . .	"	
19429	"	Orton, R. . . .	"	

To be Corporals—Continued.

No.	Rank and Name	Date	Remarks
19471	Private Johnston, D. C. ..	20.8.14	
19481	„ Mills, A. W. V. ..	„	
19532	„ Lightfoot, A. ..	„	
19533	„ Newman, E. P. ..	„	
19665	„ Boxall, H. G. ..	„	
19672	„ Healey, A. T. J. ..	„	
19698	„ Wass, M. ..	„	
19716	„ Reynolds, F. ..	„	
19790	„ Harris, W. J. ..	„	
19820	„ Stagg, H. W. ..	„	
19854	„ Allison, J. ..	„	
19939	„ Capou, F. M. ..	„	
19963	„ Gorcham, E. ..	„	
19982	„ Steele, A. C. J. ..	„	
19986	„ Gardner, W. H. ..	„	
86	„ Redfern, W. ..	„	
133	„ Waggitt, H. ..	„	
144	„ Wood, S. W. ..	„	
298	„ Bentley, A. W. ..	„	
600	„ Day, A. F. ..	„	
681	„ Tyrrell, H. ..	„	
792	„ Shearman, F. ..	„	
795	„ Hunt, H. H. ..	„	From Army Reserve.
5166	„ Blair, J. ..	„	
827	„ Stammers, A. ..	„	
873	„ Crook, W. ..	„	
918	„ Nelson, W. ..	„	
986	„ Godfrey, A. E. ..	„	
1061	„ McSweeney, J. F. ..	„	
1065	„ Dean, A. ..	„	
1247	„ Buckland, F. E. ..	„	
1689	„ Shields, H. ..	„	
1753	„ Aitken, A. ..	„	
1827	„ Spratt, T. F. ..	„	
1875	„ Kitchen, J. E. ..	„	
1940	„ Turner, J. E. ..	„	
1953	„ Merchant, H. ..	„	
2007	„ Morrell, A. F. ..	„	
2137	„ Crack, F. ..	„	
2195	„ Snape, S. E. ..	„	
2205	„ Lewis, A. R. ..	„	
2225	„ Paterson, M. ..	„	
4307	„ Mayes, H. ..	„	
4415	„ Pirret, N. McL. ..	„	
4928	„ Mack, H. R. ..	„	

These promotions are subject to the conditions laid down in paragraph 24 Standing Orders for the Royal Army Medical Corps.

APPOINTMENTS.

The following appointments will take effect from the date specified:—

To be Lance-Sergeants.

18772	Corporal Taylor, H. E. ..	20.8.14
13202	„ Pask, C. ..	„
17250	„ Hobbs, A. ..	„
18126	„ Walshe, T. P. ..	„

Buglers.

The following Boys are appointed Buglers from August 20, 1914, inclusive :—

6191	Lloyd, J. P.	7027	Stephens, A. P.	7240	Ashford, J. H.
7257	Johnston, W.	7447	Barton, A. A.	7525	Cooper, H. J.
7540	Loft, E. A.	7567	Darrock, F. P.	7617	Dunglison, C. A.
7713	Webberley, G. J. D.				

REPOSTING TO CORPS.

The undermentioned Warrant Officer, Non-commissioned Officers and Private rejoined the Corps on the dates specified :—

No.	Rank and Name		Date	Remarks
6799	Serjt.-Major	Harwood, A.	11.8.14	On recall to Service.
8938	Staff-Serjt.	Caseley, F.	10.8.14	From O.T.C.
9375	"	Allford, W.	11.8.14	"
8288	"	Andrews, M.	8.8.14	"
10849	"	Richmond, C. E. T. ..	7.8.14	"
10580	"	Gibbons, A.	11.8.14	From Col. Government.
17273	"	Jones, W. H.	17.8.14	" "
11089	"	Flint, F. S.	14.8.14	" "
18018	Serjeant	Phipps, F. D... ..	8.8.14	" "
16678	"	March, J. E.	"	From O.T.C.
10577	"	Todd, J.	"	" "
391	Corporal	Scorey, W. J... ..	"	From Col. Government.
1836	Private	Edwards, W. J.	"	" "

The following Non-commissioned Officers rejoined the Corps from the Permanent Staff of the Territorial Force on the dates specified against their names :—

10898	Staff-Serjt.	Burke, A. J.	5.9.14
12589	"	Harris, A.	"
8700	"	Cudmore, F. W.	"
10142	"	Cardwell, T. W.	"
11403	"	Wagstaffe, P. E.	"
12709	"	Ford, H. J.	6.9.14
8714	"	Walsh, A. S.	"
8587	"	Connell, J.	"
8886	"	Sparrow, E. E.	"
10540	"	Bottonley, G... ..	"
9861	"	Malyon, C.	"
10150	"	Mosby, G. D.	"
7679	"	Warner, C.	7.9.14
9578	"	Dawson, W.	"
7991	"	Freeston, J. H.	"
17057	"	Ward, M.	"
16097	"	Bowen, E.	"
10005	"	Hughes, W. T.	"
8287	"	Maitland, W. E.	10.9.14
11523	"	Shaw, H.	"
9175	"	Tasker, J.	"
11789	"	Skinner, W.	11.9.14
6366	"	Cotter, J.	16.9.14
15783	Serjeant	Lloyd, E. F. H.	5.9.14
11040	"	Stroud, J.	"
10861	"	Cleare, G.	7.9.14
13469	"	Rogers, F.	"
11513	"	Hilton, G.	10.9.14

TERRITORIAL FORCE.

ROYAL ARMY MEDICAL CORPS.

1st London (City of London) General Hospital.—Lieutenant-Colonel Walter A. Atkinson, M.D., resigns his commission, owing to ill-health, and is granted permission to retain his rank and to wear the prescribed uniform, dated March 6, 1915.

1st London (City of London) Sanitary Company.—Andrew Alexander McWhan, M.B., to be Lieutenant, dated January 11, 1915; William Nicol Watson Kennedy, M.B., to be Lieutenant, dated February 8, 1915; Constant Wells Ponder to be Lieutenant, dated February 1, 1915.

1st London (City of London) Field Ambulance.—Roger Papillon Stewart, M.B., to be Lieutenant, dated February 21, 1915; Lieutenant Martin B. H. Stratford, F.R.C.S. Edin., from attached to units other than Medical Units, to be Lieutenant, dated February 1, 1915.

2nd London (City of London) Field Ambulance.—The following announcement is substituted for that which appeared in the *London Gazette* of October 23, 1914: Captain (Honorary Lieutenant in the Army) William E. Rieilly, M.B., from the Territorial Force Reserve, to be Captain, dated September 20, 1914; Lieutenant Horace G. L. Haynes, from 2nd North Midland Field Ambulance, to be Lieutenant, dated February 9, 1915; Staff-Sergeant Edward Gooding, from the 5th Northern General Hospital, to be Quartermaster, with the honorary rank of Lieutenant, dated February 21, 1915.

2nd London (City of London) General Hospital.—Maynard Horne, M.B., to be Captain (temporary), dated December 15, 1914; Captain Charles A. Lees to be Major on the permanent personnel, dated January 1, 1915.

2nd London Casualty Clearing Station.—Captain Claude H. S. Frankau, M.B., F.R.C.S., from the 4th London General Hospital, to be Captain, dated November 22, 1914; Transport Officer and Honorary Lieutenant Frank S. Turner, from the 2nd London (City of London) Field Ambulance, to be Transport Officer, with the Honorary rank of Lieutenant, dated February 16, 1915.

3rd London (City of London) Field Ambulance.—Lieutenant Robert W. A. Salmond, M.D., from 1st (City of London) Field Ambulance, to be Lieutenant, dated February 1, 1915; George Watters Greene, M.D., to be Lieutenant, dated March 11, 1915; Acting Sergeant-Major Bernard Fairweather to be Quartermaster, with the honorary rank of Lieutenant, dated February 9, 1915.

3rd London General Hospital.—Alfred Hope Gosse, M.D., to be Lieutenant, dated January 13, 1915.

3rd London General Hospital.—Captain Dennis Embleton is seconded, dated November 20, 1914. Philip Withers Green to be Lieutenant, dated February 5, 1915.

4th London General Hospital.—Arthur Fitzwilliam Comyn, M.B., to be Lieutenant, dated November 26, 1914. George Arthur Ewart to be Lieutenant, dated January 4, 1915.

4th London Field Ambulance.—Leslie Price Harris to be Lieutenant, dated January 14, 1915; George Brentnall Pritchard to be Lieutenant, dated February 4, 1915.

1st Northern General Hospital.—James Leslie Wilson, M.B. (late Second Lieutenant, Unattached List for the Territorial Force), to be Captain, whose services will be available on mobilization, dated November 30, 1914; Captain Daniel W. Patterson, M.B., to be Major, dated March 9, 1915; Major William G. Richardson, M.B., F.R.C.S., to be Lieutenant-Colonel, dated February 1, 1915; Captain William T. Harkness, M.B., from the Northumbrian Casualty Clearing Station, to be Captain, dated February 13, 1915.

3rd Northern General Hospital.—Norton Milner to be Captain, whose services will be available on mobilization, dated January 13, 1915.

4th Northern General Hospital.—Brian Thurston Holland to be Quartermaster, with the honorary rank of Lieutenant, dated February 13, 1915.

1st Southern General Hospital.—Ernest Cordley Bradford to be Lieutenant, dated January 15, 1915; Robert Beatson Dennis Hird, M.D., to be Captain, whose services will be available on mobilization, dated February 10, 1915.

2nd Southern General Hospital.—Robert James Irving, M.B., F.R.C.S. Edin., to be Lieutenant, dated January 19, 1915.

3rd Southern General Hospital.—Robert Garner Lynam, M.B., to be Captain,

whose services will be available on mobilization, dated February 15, 1915; Fielding Clarke to be Captain, whose services will be available on mobilization, dated February 5, 1915; James Andrew Gunn, M.D., to be Lieutenant, dated February 1, 1915; Frank Gower Gardner to be Lieutenant, dated January 29, 1915.

Home Counties Divisional Train, No. 2 (Surrey Brigade) Company.—Second Lieutenant William R. Bucknall to be Lieutenant (temporary), dated February 16, 1915.

1st Home Counties Field Ambulance.—Charles Donald Chamberlin Saker to be Quartermaster with the honorary rank of Lieutenant, dated February 8, 1915; Richard Austin Freeman to be Lieutenant, dated February 10, 1915.

2nd Home Counties Field Ambulance.—Captain Antony Alexander Martin, M.D., from 1st Home Counties Field Ambulance, to be Captain, dated March 2, 1915; Captain James Dundas, M.B., from Sanitary Service, to be Captain, dated August 5, 1914; Lieutenant Ernest Mannering Morris, from attached to units other than Medical Units, to be Lieutenant, dated August 5, 1914; George Mortimer McGilivray, M.B., to be Lieutenant, dated November 30, 1914.

3rd Home Counties Field Ambulance.—Captain James Barkley to be Major (temporary), dated January 5, 1915; Major Stanley A. Coad to be Lieutenant-Colonel (temporary), dated March 2, 1915; Captain Edwin A. Houchin to be Major (temporary), dated March 9, 1915; Captain William D. Sturrock, M.D., from the Unattached List for the Territorial Force, to be Captain (temporary), dated December 11, 1914.

Eastern Mounted Brigade Field Ambulance.—Kenneth Bleckly Clarke to be Lieutenant, dated February 1, 1915; James Lamberton, M.B., to be Lieutenant, dated February 20, 1915.

South Eastern Mounted Brigade Field Ambulance.—Charles Edward Silvester, M.B. (late Surgeon-Captain, Surinam Valley Light Horse), to be Lieutenant, dated January 9, 1915; Edgar Milwyn Jenkins, M.B., to be Lieutenant, dated January 1, 1915.

Lowland Casualty Clearing Station.—Lieutenant-Colonel Peter F. Shaw resigns his commission on account of ill-health, and is granted permission to retain his rank and wear the prescribed uniform, dated March 2, 1915.

2nd Lowland Field Ambulance.—The undermentioned to be Lieutenants: Stephen Anderson MacPhee, M.B., dated January 9, 1915; Colin Cameron Philip, M.B. (late Cadet, Edinburgh University Contingent, Senior Division, Officers Training Corps), dated January 13, 1915; James Angus, M.B., to be Lieutenant, dated January 25, 1915.

West Riding Casualty Clearing Station.—Serjeant-Major Robert Daniel Matthews to be Quartermaster, with the honorary rank of Lieutenant, dated February 9, 1915.

1st Northumbrian Field Ambulance.—Home Alexander Playfair Robertson, M.B., to be Lieutenant, dated January 1, 1915; Kirton Ivor Seager Smith, M.B., to be Lieutenant, dated February 5, 1915.

2nd Northumbrian Field Ambulance.—William Smith, M.B., to be Lieutenant, dated December 28, 1914. The date of appointment of Lieutenant William Smith, M.B., is December 7, 1914, and not as stated in the *London Gazette* of February 8, 1915; Captain Arthur C. H. McCullagh, M.B., to be Major (temporary), dated January 28, 1915.

1st Scottish General Hospital.—The undermentioned to be Captains, whose services will be available on mobilization, dated January 2, 1915: John Taylor, M.D.; Thomas Wilson Alexander, M.B. George Stuart, M.B., to be Captain, whose services will be available on mobilization, dated February 10, 1915.

4th Scottish General Hospital.—Lieutenant James H. Martin, M.D., from attached to units other than Medical Units, to be Captain, whose services will be available on mobilization, dated January 12, 1915; William Archibald Campbell, M.B., F.R.C.S., to be Captain, whose services will be available on mobilization, dated February 2, 1915.

1st East Anglian Field Ambulance.—The date of appointment of Lieutenant Harry Whitaker, M.B., is October 8, 1914, and not as stated in the *London Gazette* of November 3, 1914. The date of appointment of Lieutenant Alfred E. Delgado, M.B., is October 16, 1914, and not as stated in the *London Gazette* of November 6, 1914. The date of appointment of Transport Officer and Honorary Lieutenant Harry Harris is September 21, 1914, and not as stated in the *London Gazette* of October 14, 1914; Hugh Frederick Gethin Hall, M.B., to be Lieutenant, dated January 22, 1915; Ambrose Cyril Wilson to be Lieutenant, dated February 11, 1915; Captain William James Hoyten, M.D., from attached to units other than Medical Units, to be Captain, dated January 23, 1915; Lieutenant Thomas Vicars Oldham, M.B., from attached to units other than Medical Units, to be Lieutenant, dated February 13, 1915.

2nd East Anglian Field Ambulance.—Captain Rees Phillips, M.D., to be Major (temporary), dated March 6, 1915; Edmund Albert Goulden, M.D., to be Lieutenant, dated February 3, 1915; Frederick George Sharpe to be Lieutenant, dated February 1, 1915.

3rd East Anglian Field Ambulance.—Major George Alexander Troup, M.D., to be Lieutenant-Colonel (temporary), dated January 17, 1915.

East Anglian Casualty Clearing Station.—Captain John Henry Dauber, M.B., F.R.C.S.I., from attached to units other than Medical Units, to be Major, dated February 25, 1915.

South Midland Divisional Train.—Lieutenant Charles P. Ackers is restored into the establishment, dated March 4, 1915.

1st South Midland Field Ambulance.—Major William M. Sturrock, M.B., to be Lieutenant-Colonel (temporary), dated November 2, 1914.

1st South Midland Mounted Brigade Field Ambulance.—Captain Douglas M. Spring, M.B., to be Major (temporary), dated October 20, 1914.

2nd South Midland Mounted Brigade Field Ambulance.—Henry John Blackler, M.B., to be Lieutenant, dated February 10, 1915; Alfred Goodman Levy, M.B., to be Lieutenant, dated February 1, 1915.

3rd South Midland Field Ambulance.—Major Bertram M. H. Rogers, M.D., to be Lieutenant-Colonel (temporary), dated November 2, 1914; Lieutenant James G. McLennahan, from attached to units other than Medical Units, to be Lieutenant, dated February 2, 1915.

North Midland Mounted Brigade Field Ambulance.—Arthur Wellesley McClelland, M.D., to be Lieutenant, dated December 23, 1914.

2nd North Midland Field Ambulance.—Lieutenant Hubert Pinto-Leite, from the 2nd London (City of London) Field Ambulance, to be Lieutenant, dated February 9, 1915. Transport Officer and Honorary Lieutenant Thomas Read resigns his commission, dated March 13, 1915.

3rd North Midland Field Ambulance.—James Ernest Sutcliffe Smith, M.B., to be Lieutenant, dated January 22, 1915. William Batten Williams, M.B., to be Lieutenant, dated January 23, 1915; George Fanning Denning to be Lieutenant, dated January 23, 1915; Thomas Lovett, M.B., to be Lieutenant, dated January 28, 1915.

1st West Riding Field Ambulance.—Lieutenant Henry Norman Goode, M.B., F.R.C.S. Edin., to be Captain (temporary), dated February 4, 1915.

2nd West Riding Field Ambulance.—Benjamin Holroyd to be Lieutenant, dated January 19, 1915.

3rd West Riding Field Ambulance.—John Stratford Hall, M.B., to be Lieutenant, dated February 1, 1915; Surgeon Captain William Smith Kerr, M.B., F.R.C.S. Edin., from the 4th (Hallamshire) Battalion, York and Lancaster Regiment, to be Captain, dated February 18, 1915.

1st Welsh Field Ambulance.—Major John Howard-Jones, M.B., to be Lieutenant-Colonel (temporary), dated January 12, 1915; Captain John O'Sullivan to be Major (temporary), dated December 1, 1914; John Sloan Tomb, M.B., to be Lieutenant, dated February 1, 1915; Henry Mills to be Lieutenant, dated January 26, 1915; Alexander Edward Mackenzie to be Lieutenant, dated January 27, 1915; Lieutenant Arvor Jones, from attached to units other than Medical Units, to be Lieutenant, dated February 1, 1915.

2nd Welsh Field Ambulance.—David Thomas Lewis to be Lieutenant, dated January 7, 1915; Thomas Peters Edwards, M.D., to be Lieutenant, dated January 11, 1915.

3rd Welsh Field Ambulance.—The undermentioned Captains, from attached to units other than Medical Units, to be Captains, dated February 1, 1915: Frederick A. W. Drinkwater, Percy C. P. Ingram, M.B. Lieutenant Peyton T. Warren, from attached to units other than Medical Units, to be Lieutenant, dated February 1, 1915.

West Lancashire Casualty Clearing Station.—Harry Driffield Levick, M.B., F.R.C.S., to be Lieutenant, dated January 10, 1915.

1st West Lancashire Field Ambulance.—Captain John E. W. McFall, M.D., to be Major (temporary), dated January 15, 1915.

1st East Lancashire Field Ambulance.—Gilbert Bailey to be Lieutenant, dated January 8, 1915; Transport Officer and Honorary Captain George R. Wattleworth is granted the honorary rank of Major, dated March 9, 1915; John Bruce, M.B. (late Surgeon-Captain, 3rd Volunteer Battalion, The Lincolnshire Regiment), to be Lieutenant, dated January 15, 1915; William Lonsdale Cockcroft to be Lieutenant, dated January 26, 1915.

2nd East Lancashire Field Ambulance.—James Douglas to be Quartermaster, with the honorary rank of Lieutenant, dated November 10, 1914.

3rd East Lancashire Field Ambulance.—Henry Wilson, M.B., to be Lieutenant, dated December 24, 1914.

2nd West Lancashire Field Ambulance.—Sydney Sharples (late Lieutenant, 2nd West Lancashire Brigade, Royal Field Artillery) to be Lieutenant, dated March 4, 1915.

3rd West Lancashire Field Ambulance.—Walter Richards Stephen, M.B., to be Lieutenant, dated February 1, 1915.

Welsh Casualty Clearing Station.—Major Alexander P. Swanson, from attached to units other than Medical Units, to be Lieutenant-Colonel (temporary), dated February 25, 1915.

South Wales Mounted Brigade Field Ambulance.—Major Herbert Jones to be Lieutenant-Colonel (temporary), dated September 15, 1914.

London Mounted Brigade Field Ambulance.—Ernest George Thornton Poynder to be Lieutenant, dated February 1, 1915.

4th London Field Ambulance.—Major Arthur E. Jerman, M.B., to be Lieutenant-Colonel (temporary), dated September 9, 1914. The undermentioned Captains to be Majors (temporary), dated February 1, 1915: Percy W. Thompson, John R. Holmes, M.B.

1st Wessex Field Ambulance.—The date of appointment of Lieutenants George D. Perry and Robert Burgess is August 5, 1914, and not as stated in the *London Gazette* of September 15, 1914.

2nd Western General Hospital.—Thomas Pomfret Kilner, M.B., to be Lieutenant, dated February 24, 1915. The announcement of the appointment as Lieutenant of Frank Graham Wrigley, M.D., which appeared in the *London Gazette* of November 23, 1914, is cancelled.

Yorkshire Mounted Brigade Field Ambulance.—Captain John Hepple to be Major (temporary), dated February 5, 1915.

1st Eastern General Hospital.—The undermentioned to be Captains, whose services will be available on mobilization, dated February 1, 1915: Wilson Tyson, M.D.; William Burton Marshall, M.B. Staff-Serjeant Herbert Francis Rutherford to be Quartermaster, with the honorary rank of Lieutenant, dated March 13, 1915.

Lieutenant-Colonel Henry George Falkner, from attached to units other than Medical Units, to be Assistant Director of Medical Services, Northumbrian (Reserve) Division, with the rank of Colonel (temporary), dated March 7, 1915.

The date of appointment of Major Gerald C. Taylor as Deputy Assistant Director of Medical Services, 2nd Mounted Division, is October 16, 1914, and not as stated in the *London Gazette* of November 3, 1914.

Major Henry M. W. Gray, M.B., F.R.C.S. (Edin.), Royal Army Medical Corps, Territorial Force, to be temporary Colonel, dated February 1, 1915.

Captain William Hunter, M.D., F.R.C.P., 4th London General Hospital, Royal Army Medical Corps, Territorial Force, to be temporary Colonel, dated February 12, 1915.

supernumerary Captain Travis C. Lucas, M.B., is restored to the establishment, dated January 5, 1915.

Captain James R. Chalmers, M.B., from the 4th Scottish General Hospital, to be Captain, dated February 27, 1915.

Captain William J. Foster, F.R.C.S., from the 3rd Southern General Hospital, to be Captain, dated March 6, 1915.

Colonel de Burgh Birch, C.B., M.D., retired list Territorial Force, to be Assistant Director of Medical Services, West Riding Reserve Division, dated February 23, 1915.

Canada. Colonel Guy C. Jones, Director-General of Medical Services, Canada, to be temporary Surgeon-General, dated January 26, 1915.

ATTACHED TO UNITS OTHER THAN MEDICAL UNITS.

Captain James Aitken, M.B., to be Major (temporary), dated August 5, 1914.

Robert William Meikle (late Captain, Royal Army Medical Corps, Territorial Force) to be Captain, dated September 14, 1914.

Lieutenant Gerald R. Rickett, M.D., to be Captain (temporary), dated November 1, 1914.

Gerald Francis Carr to be Lieutenant, dated December 11, 1914.

William Brown, M.D., to be Lieutenant, dated December 27, 1914.

Honorary Captain Arthur Ricketts, C.M.G., M.D., to be Captain, dated January 2, 1915.

Frederick William Arthur Stott, M.B., to be Lieutenant, dated January 13, 1915.
 Arthur Henry Fullerton, M.B. (late Lieutenant, 1st Volunteer Battalion, East Yorkshire Regiment), to be Lieutenant, dated January 14, 1915.
 Frederick George Vickars to be Lieutenant, dated January 15, 1915.
 Hugh Arthur Sandiford, M.B., to be Lieutenant, dated January 15, 1915.
 William Alfred Philipps, M.D., to be Lieutenant, dated January 18, 1915.
 Ivan William MacKinnon, M.D., to be Lieutenant, dated January 20, 1915.
 Kenneth John Taylor Keer to be Lieutenant, dated January 23, 1915.
 Charles Stewart Young (late Surgeon-Captain, 3rd Volunteer Battalion, Royal Highlanders) to be Captain, dated January 24, 1915.
 Lieutenant George F. R. Smith, M.B., is seconded, dated February 2, 1915.
 Lieutenant Kenneth MacKinnon, M.B., resigns his commission, dated February 2, 1915.
 Walter Smartt, F.R.C.S.I., to be Lieutenant, dated February 11, 1915.
 Lieutenant Herbert W. Joyce resigns his commission on account of ill-health, dated February 13, 1915.
 Lieutenant-Colonel and Honorary Surgeon-Colonel George Hollies, M.D., resigns his commission on account of ill-health, dated February 13, 1915.
 Major Peverell S. Hichens, M.D., from 1st Eastern General Hospital, to be Major, dated February 13, 1915.
 Ernest Osborne to be Lieutenant, dated February 18, 1915.
 Surgeon-Major Bertram Addenbrooke, M.D., from 7th Battalion, The Worcestershire Regiment, to be Major, dated February 21, 1915.
 Captain Francis Rowland, from the 6th London Field Ambulance, to be Captain, dated February 21, 1915.
 Lieutenant Charles D. Mathias, M.B., to be Captain (temporary), dated August 5, 1914.
 Charles Rosser Bishop (late Major, 4th Battalion, Prince Albert's, Somerset Light Infantry) to be Major, dated December 12, 1914.
 Captain David R. Taylor to be Major, dated December 18, 1914.
 Captain Leonard A. Avery to be Major (temporary), dated December 24, 1914.
 Michael Brannan, M.B. (late Cadet, Durham University Contingent, Senior Division, Officers Training Corps), to be Lieutenant, dated January 1, 1915.
 Alexander Fraser Wilson, M.B., to be Lieutenant, dated January 21, 1915.
 Lieutenant Robert Donald to be Captain, dated January 27, 1915.
 Major John Griffiths, from South Wales Mounted Brigade Field Ambulance, to be Major, dated February 1, 1915.
 James McGavin Deuchars, M.B., to be Lieutenant, dated February 4, 1915.
 William Horton Date, M.D., to be Lieutenant, dated February 6, 1915.
 Henry Frederick John Graves to be Lieutenant, dated February 8, 1915.
 Lieutenant Alfred Errol Delgado, M.B., from 1st East Anglian Field Ambulance, to be Lieutenant, dated February 13, 1915.
 Captain Ellerington Reed Turner, M.B., resigns his commission on account of ill-health, dated February 24, 1915.
 John James Egerton Biggs (late Captain, 7th (Cyclist) Battalion, The Welsh Regiment) to be Lieutenant, dated February 24, 1915.
 Cecil Randle Harper to be Lieutenant, dated March 2, 1915.
 Joseph Loughed Baskin to be Lieutenant, dated March 2, 1915.
 John Murdoch, M.B., F.R.C.S. Edin. (late Captain, 7th Battalion, Princess Louise's, Argyll and Sutherland Highlanders), to be Captain, dated March 4, 1915.
 Charles Joshua Fox (late Lieutenant, 13th (County of London) Princess Louise's Kensington Battalion, The London Regiment) to be Lieutenant, dated March 5, 1915.
 Lieutenant Arthur E. Ridsdale to be Captain, dated March 10, 1915.
 Major David L. Todd to be seconded under paragraph 112, Territorial Force Regulations, dated March 11, 1915.
 Surgeon-Captain George D. Kettlewell, from Devonshire Royal Garrison Artillery, to be Captain, dated March 11, 1915.
Sanitary Service.— Captain Leonard R. Toswill, from 3rd East Anglian Field Ambulance, to be Sanitary Officer, East Anglian Reserve Division, dated January 6, 1915. Major Peter Caldwell Smith, M.D., to be Lieutenant-Colonel, dated February 1, 1915. Major Charles M. Fegen, from 2nd London Sanitary Company, to be Sanitary Officer of the 2nd London (Reserve) Division, dated February 3, 1915. Alfred Ernest Williams, M.D., to be Captain, whose services will be available on mobilization, dated

February 6, 1915. Major Alfred Greenwood, M.D., to be Lieutenant-Colonel (temporary), dated February 14, 1915. Major Francis E. Fremantle, M.B., F.R.C.S., to be Lieutenant-Colonel (temporary), dated February 14, 1915. George Henry Weston, M.B. (late Lieutenant, 2nd Volunteer Battalion, Hampshire Regiment), to be Captain, whose services will be available on mobilization, dated February 14, 1915.

Territorial Force Nursing Service.—Miss Annie Kerslake to be Matron, 1st Southern General Hospital, dated January 22, 1915.

UNATTACHED LIST FOR THE TERRITORIAL FORCE.

John Williams Furse Forbes (late Captain, Christ's Hospital Contingent, Junior Division, Officers Training Corps) to be Captain, for service with that Contingent, dated March 13, 1915.

Herbert Pelham Pestle to be Second Lieutenant, for service with the Ellesmere College Contingent, Junior Division, Officers Training Corps, dated February 3, 1915.

Cadet Hart Philip Sparling, from Gresham's School Contingent, Junior Division, Officers Training Corps, to be Second Lieutenant, for service with that Contingent, dated March 13, 1915.

SPECIAL RESERVE OF OFFICERS.

ROYAL ARMY MEDICAL CORPS.

The undermentioned Lieutenants to be Captains :—

Dated November 17, 1914.—Robert Dunlop Goldie.

Dated December 19, 1914.—Philip Norman Button.

Dated January 15, 1915.—John Owen Reid.

Dated January 30, 1915.—Sydney Walker Lund, M.B.

Dated January 31, 1915.—Charles Hope Carlton.

Dated February 7, 1915.—D'Arcy Power.

MEMORANDA.

The undermentioned Lieutenants are confirmed in their rank :—

Dated February 19, 1915.—Frederick Sanders; George S. Pirie; Howell M. Williams; William D. Anderton; Edwin J. Bradley; Frank Oppenheimer; James W. Wood; George M. Scott.

The undermentioned to be temporary Lieutenants :—

Dated January 20, 1915.—Stanley Burrough King.

Dated January 21, 1915.—Henry Richard Sheppard, Cadet of the Officers Training Corps.

Dated January 30, 1915.—Robert Harvey Williams, ex-Cadet of the Officers Training Corps.

Dated February 1, 1915.—Edward Waller Mann, M.B., ex-Cadet of the Officers Training Corps. Second Lieutenant Owen Parry-Jones, from General Reserve of Officers.

Dated February 5, 1915.—William Theodore Hare.

Dated February 18, 1915.—Albert Edward Barnett.

John S. Dockrill; Henry P. Whitworth; Thomas H. S. Bell; Francis A. Duffield; John J. D. La Touche; Joseph H. Baird; John J. Molyneaux; John Stephenson; James Purdie; Clark Nicholson; William S. Wallace; Samuel D. G. McEntire; Gerald G. Alderson; Arthur A. Smalley; Wilfrid B. Wood; Francis A. Roddy; Harold A. Crouch; Herbert S. Milne; John S. Pooley; Quentin V. B. Wallace; William H. Nicholls; Henry Alcock; John Kennedy; Thomas F. Kennedy.

The undermentioned Lieutenants resign their commission :—

Dated December 26, 1914.—Lieutenant John Brumwell resigns his commission, on appointment to the Royal Naval Volunteer Reserve.

Dated December 21, 1914.—George A. Clark.

Dated January 1, 1915.—Carl D. Newman.

Dated February 3, 1915.—William O. Lodge.

Dated February 16, 1915.—James F. Quigley, M.B.

Captain George H. Usmar resigns his commission, dated February 19, 1915.

Captain Thomas Douglas Inch, M.B., from the Unattached List, Territorial Force, to be Lieutenant, dated January 19, 1915.

The undermentioned to be Lieutenants (on probation) :—

Dated January 4, 1915.—John Dillon MacCormack.

Dated January 24, 1915.—Charles Montage Gordon Campbell, ex-Cadet of the Officers Training Corps.

Dated February 10, 1915.—Noel Humphrey Wykeham Saw.

Dated February 27, 1915.—Lieutenant Joseph H. Churchill, from attached to units other than Medical Units; Franke Chamberlain Hart-Smith, M.B., F.R.C.S.

Dated March 5, 1915.—Temporary Lieutenant Arthur Martin Leake, V.C.

Lieutenant Arthur A. Martin, M.D., F.R.C.S.Edin., relinquishes his temporary commission, dated February 2, 1915.

Temporary Lieutenant William Anderson, having ceased to serve with the British Red Cross Hospital, Netley, relinquishes his commission, dated February 2, 1915.

Temporary Lieutenant Harold M. Cory relinquishes his commission, dated February 7, 1915.

Lieutenant Cecil Corbin, M.B., relinquishes his temporary commission, dated February 7, 1915.

Temporary Lieutenant Charles J. Thompson, relinquishes his commission, dated February 7, 1915.

Temporary Lieutenant Charles Cavanagh, relinquishes his commission, dated February 11, 1915.

DEATHS.

EXHAM.—Colonel Richard Exham, C.M.G., retired pay, late R.A.M.C., died at 1, Mutley Park Villas, Plymouth, on February 1, 1915, aged 66.

CROSS.—Surgeon-Lieutenant-Colonel Horatio Robert Odo Cross, retired pay, late 1st Life Guards, died at London, on February 3, 1915, aged 68.

HYDE.—Major Patrick George Hyde, M.B., R.A.M.C., died at Aldershot, on March 2, 1915, aged 38.

FLEMING.—Major Charles Elphinstone Fleming, M.B., R.A.M.C., died at 11, Crown Terrace, Glasgow, W., on March 2, 1915, aged 40.

RUDGE.—Honorary Deputy Surgeon-General Arthur Rudge, Surgeon-Major, retired, Medical Department, died at The Tower, Higher Compton, Plymouth, on February 20, 1915, aged 88.

EXCHANGES, &c.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd., 8, Serle Street, London, W.C., not later than the 22nd of the month.

A free issue of twenty-five reprints will be made to contributors of Original Communications, and of twenty-five excerpts of Lectures, Travels, and Proceedings of the United Services Medical Society.

Any demand for excerpts, additional to the above, or for reprints, must be forwarded at the time of submission of the article for publication, and will be charged for at the following rates, and additional copies at proportionate rates:—

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	8	0 9 0	0 4 4				
	16	0 16 9	0 6 9				
200	4	0 8 6	0 4 0	9 0	6 3	7 6	4 0
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Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

All such Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the Author notifies at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," War Office, Whitehall, London, S. W.

Communications have been received from Colonel R. H. Firth, Major C. E. Pollock, Lieutenant H. K. Ward, Lieutenant-Colonel L. W. Harrison, Colonel H. N. Thompson, D.S.O., Captain L. B. Cane.

The following publications have been received :—

British : *Guy's Hospital Gazette, The Journal of State Medicine, The Hospital, Tropical Diseases Bulletin, The Liverpool School of Tropical Medicine, The Indian Medical Journal, The Indian Journal of Medical Research, The Medical Review, Public Health, The Journal of Tropical Medicine and Hygiene, Medical Press and Circular, The Liverpool Medico-Chirurgical Journal, Journal of the United Service Institution of India, The Sanitary Record and Municipal Engineering, Medical Journal of Australia, Transactions of the Society of Tropical Medicine and Hygiene, The Medical Journal of South Africa, The St. Thomas's Hospital Gazette, The Practitioner, The Middlesex Hospital Journal, The Royal Engineers' Journal, Proceedings of the Royal Society, Red Cross and Ambulance News, The Lancet, The Army Service Corps Journal, St. Bartholomew's Hospital Journal, The Indian Medical Gazette.*

Foreign : *Revista de Sanidad Militar, The Journal of Infectious Diseases, United States Public Health Service, Annali di Medicina Navale e Coloniale, Bulletin de l'Institut Pasteur, Le Caducée, Office International d'Hygiène Publique, Bulletin de la Société de Pathologie Exotique, Giornale di Medicina Militare, Bulletin of the Johns Hopkins Hospital.*

MANAGER'S NOTICES.

The **JOURNAL OF THE ROYAL ARMY MEDICAL CORPS** is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

The Annual Subscription is £1 (which includes postage), and should commence either on 1st July or 1st January; but if a subscriber wishes to commence at any other month he may do so by paying for the odd months between 1st July and 1st January at the rate of 1s. 8d. (one shilling and eightpence) per copy. (All subscriptions are payable in advance.)

Single copies can be obtained at the rate of 2s. per copy.

The Corps News is also issued separately from the Journal, and can be subscribed for at the rate of 2s. (two shillings) per annum, including postage. Subscriptions should commence from 1st July each year; but if intending subscribers wish to commence from any other month, they may do so by paying for the odd months at the rate of 2d. per copy. (All subscriptions are payable in advance.)

Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager, "Journal of the Royal Army Medical Corps," War Office, Whitehall, London, S.W., and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

It is requested that all Cheques or Postal Orders for Subscriptions to the Journal, Corps News, Reprints, &c., be crossed "Holt & Co.," and made payable to the "Hon. Manager, Journal R.A.M.C.," and not to any individual personally.

All communications for the Hon. Manager regarding subscriptions, etc., should be addressed to

THE HON. MANAGER,

"JOURNAL OF THE ROYAL ARMY MEDICAL CORPS,"

WAR OFFICE, WHITEHALL, S.W.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

FEBRUARY, MARCH AND APRIL, 1915.

EXTRACT FROM "LONDON GAZETTE," FEBRUARY 17, 1915.

War Office,
February 17, 1915.

The following despatch has been received by the Secretary of State for War from the Field Marshal Commanding-in-Chief, British Forces in the Field :—

" January 14, 1915.

" MY LORD, — In accordance with the last paragraph of my despatch of November 20, 1914, I have the honour to bring to notice names of those whom I recommend for gallant and distinguished service in the Field.

" I have the honour to be,
" Your Lordship's most obedient servant,
(Signed) " J. D. P. FRENCH.
" Field Marshal, Commanding-in-Chief
The British Army in the Field."

GENERAL HEADQUARTERS STAFF, ETC.

<p>Brunskill, Major J. H., M.B. Dalton, Lieutenant-Colonel C. (died of wounds received in action). Ensor, Major H., D.S.O., M.B. Ferguson, Lieutenant-Colonel N. C., C.M.G., M.B. Geddes, Colonel R. J., D.S.O., M.B. Holt, Brevet-Colonel M. P. C., D.S.O. Hughes, Major G. W. G. Irvine, Major F. S., M.B. Martin, Major J. F., M.B.</p>	<p>Meek, Colonel J., M.D. Moore, Lieutenant-Colonel S. G. Morgan, Major C. K., M.B. Moss, Captain E. L. O'Keefe, Colonel M. W., M.D. Porter, Surgeon-General (temporary) R., M.B. Sawyer, Colonel R. H. S., M.B., F.R.C.S.I. Sloggett, Surgeon-General Sir A. T., Knt. Swan, Colonel W. T., M.B. Treherne, Colonel F. H., F.R.C.S. Edin.</p>
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MEDICAL SERVICES.

<p>Barbour, Major J. H., M.B. Bateman, Major H. R. Beatty, Major M. C., M.B. Bewley, Lieutenant-Colonel A. W. Black, Major R. B., M.B. (Reserve of Officers). Bowlby, Colonel (temporary) Sir A. A., Knight, C.M.G., F.R.C.S. Bradford, Colonel (temporary) Sir J. R., K.C.M.G., F.R.S., M.D. Brazier-Creagh, Lieutenant-Colonel G. W., C.M.G. Burtchaell, Lieutenant-Colonel (temporary Colonel), C. H., M.B. Campbell, Captain J. H., M.B. Chalk, Quartermaster and Hon. Major A. J.</p>	<p>Barbour, Major J. H., M.B. Bateman, Major H. R. Beatty, Major M. C., M.B. Bewley, Lieutenant-Colonel A. W. Black, Major R. B., M.B. (Reserve of Officers). Bowlby, Colonel (temporary) Sir A. A., Knight, C.M.G., F.R.C.S.</p>
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Medical Services—Continued.

Dennis, Major B. R., M.B.
 Dwyer, Captain P., M.B.
 Ellis, Major W. F.
 Evans, Major C. R.
 Evans, Major P., M.B.
 Fell, Major M. H. G.
 Glasse, Lieutenant (temporary) J. M., M.B.
 Goodbody, Major C. M. (Indian Medical Service).
 Hardy, Lieutenant-Colonel F. W., M.B.
 Harrison, Major L. W., M.B.
 Huntingford, Quartermaster and Hon. Lieutenant A.
 Jones, Colonel F. W. C., M.B.
 Kiddie, Major F., M.B.
 Lawson, Lieutenant-Colonel C. B., M.B.
 Leake, Major J. W.
 Leishman, Brevet-Colonel Sir W. B., Knight, F.R.S., M.B., F.R.C.P., K.H.P.
 Luther, Lieutenant-Colonel A. J.
 Macdonald, Lieutenant-Colonel S., M.B.
 McMunn, Major J. R.
 Macpherson, Surgeon-General W. G., C.M.G., M.B., K.H.P.
 Makins, Colonel (temporary) G. H., C.B., F.R.C.S.
 Middleton-West, Captain S. H., F.R.C.S. (Indian Medical Service).
 Nash, Lieutenant-Colonel L. T. M.

Needham, Major R. A., M.B. (Indian Medical Service).
 Norrington, Major H. L. W.
 O'Donnell, Colonel (temporary Surgeon-General) T. J., D.S.O.
 O'Grady, Major S. de C., M.B.
 Osborne, Quartermaster and Hon. Lieutenant J. W.
 Pile, G. H., Esq. (British Red Cross Society) (recommended by G. O. C. II. Corps).
 Power, Major W. M.
 Prescott, Major J. J. W., D.S.O.
 Purser, Major L. M., M.B.
 Rahilly, Captain J. M. B., M.B.
 Ryles, Captain C., M.B.
 Scott, Lieutenant-Colonel B. H.
 Shanahan, Lieutenant-Colonel D. D.
 Starr, Lieutenant-Colonel W. H.
 Stephens, Major F. A.
 Tabuteau, Captain G. G.
 Thomson, Major C. G.
 Tyndale, Major W. F., C.M.G., M.D.
 Unwin, Major T. B., M.B.
 Wall, Major F. (Indian Medical Service).
 Watkins, Quartermaster and Hon. Captain J.
 Watts, Major B.

Baker, 14461 Serjeant-Major A.
 Banks, 9929 Serjeant-Major J.
 Barnes, 18020 Private C. A.
 Barnes, 12989 Staff-Serjeant E. G. W.
 Bell, 18415 Staff-Serjeant
 Bennett, 11225 Serjeant-Major A.
 Burnham, Driver F., A.S.C. (attached).
 Currie, 10420 Staff-Serjeant A. W.
 Davidson, 1972 Corporal B.
 Davis, 9940 Serjeant-Major F.
 Day, 4961 Corporal A.
 Dell, 19021 Quartermaster Serjeant A. A.
 Earp, 11509 Serjeant-Major J. J.
 Edwards, 12617 Staff-Serjeant J. R.
 Gerrie, 18507 Serjeant W. A.
 Gosling, 11946 Quartermaster-Serjeant E. J.
 Greenhalgh, 18131 Corporal W.
 Hughes, 19102 Serjeant H. C.
 Hurran, 14464, Serjeant-Major G. F.

Kemp, Serjeant E., A.S.C. (attached).
 Le Poidevin, 16090 Quartermaster-Serjeant P.
 Leppington, 16482 Staff-Serjeant W. C.
 McEnnery, 17179 Private T.
 Muirhead, 14705 Quartermaster-Serjeant W. A.
 Munden, 2189 Serjeant J. W. F.
 Newton, 12104 Quartermaster-Serjeant J. E.
 Perritt, 10895 Quartermaster Serjeant W. E.
 Reeve, 10892 Serjeant-Major H. J.
 Robinson, 6507 Private F.
 Snow, 14663 Serjeant-Major P.
 Spiers, 18873 Serjeant W. J.
 Springett, 16047 Quartermaster-Serjeant A.
 Tunncliffe, 4973 Corporal T. A.
 Vogel, 3878 Private W. H.
 Yates, 22517 Staff-Serjeant, A.C.S. (attached).

ROYAL ARMY MEDICAL CORPS.

Balfour, Lieutenant T. H., M.B.
 Bazett, Lieutenant H. C., M.B., F.R.C.S. (Special Reserve).
 Bliss, Major E. W.
 Bowle, Captain S. C.
 Taylor, Lieutenant (temporary) R. B.
 Browne, Captain T. W.
 Buckley, Quartermaster and Hon. Lieutenant E. J.

Bullock, Lieutenant (temporary) A. E.
 Carrington, Lieutenant (temporary) E. W., M.B.
 Carruthers, Captain V. T., M.B., F.R.C.S.
 Carter, Captain H. St. M., M.D.
 Charles, Lieutenant J. P., M.B.
 Clements, Major R. W., M.B.
 Copeland, Lieutenant-Colonel R. J., M.B.
 Cowtan, Lieutenant F. G.

Royal Medical Army Corps—Continued.

- Crawford, Major V. J.
 Crawford, Lieutenant-Colonel G. S., M.D.
 Davidson, Lieutenant F. C., M.B.
 Dunne, Captain J. S., D.S.O., F.R.C.S.I.
 FitzGerald, Major FitzG. G.
 Forde, Lieutenant-Colonel B., M.B.
 Fox, Major A. C.
 Fraser, Captain, A. D., M.B.
 Freeman, Lieutenant F. P. (Special Reserve).
 Glanvill, Captain E. M., M.B. (killed in action).
 Greenless, Lieutenant (temporary) J. R. C., M.B.
 Greenwood, Major A. R.
 Griffin, Lieutenant (temporary) E. H., M.D.
 Grogan, Captain J. B.
 Gwynne, Lieutenant J. FitzG., M.B.
 Hare, Lieutenant J., M.B.
 Helm, Lieutenant C.
 Honeybourne, Captain V. C.
 Hooper, Major A. W., D.S.O.
 Hudleston, Major W. E.
 Ingram, Lieutenant (temporary) W. W., M.B.
 Jackson, Lieutenant (temporary) J. L., M.B.
 James, Lieutenant (temporary) P. W., M.B.
 Kelly, Captain C., M.D.
 Lang, Lieutenant E. C., M.B.
 Lloyd-Jones, Captain P. A., M.B.
 Loughnan, Captain W. F. M.
 Lyon, Lieutenant D. M., M.B. (Special Reserve).
 McCullagh, Lieutenant W. McK. H., M.B. (Special Reserve).
 MacDougall, Major A. J., M.B.
 McLoughlin, Lieutenant-Colonel G. S., D.S.O., M.B.
 McQueen, Captain C.
 Martin, Lieutenant (temporary) A., M.D., F.R.C.S.
 Martin-Leake, Lieutenant (temporary), V.C.
 Mathews, Lieutenant (temporary) J. B.
 Maurice, Major G. T. K.
 Meaden, Captain A. A.
 Milne, Lieutenant (temporary) F. W.
 Milne-Thomson, Lieutenant-Colonel A. (T.F.).
 Nickerson, Major H. W. S., V.C., M.B.
 O'Keeffe, Captain J. J., M.B.
 Ormsby, Major G. J. A., M.D.
 Percival, Lieutenant E., M.B.
 Phelan, Captain E. C., M.B.
 Philipps, Lieutenant R. B.
 Phillips, Captain T. McC. (died of wounds received in action).
 Pickard, Lieutenant-Colonel R., M.D. (T.F.).
 Pirrie, Lieutenant I. M., M.B. (Special Reserve).
 Pirrie, Lieutenant R. E., M.B. (killed in action).
 Potts, Captain E. T., M.D.
 Price, Lieutenant R. B., M.B.
 Profeit, Major C. W., M.B.
 Purdon, Captain W. B., M.B.
 Rattray, Major M. MacG., M.B.
 Richards, Major F. G.
 Richardson, Lieutenant M., M.B. (died of wounds received in action).
 Roberts, Captain F. E.
 Robertson, Captain H. G., M.B.
 Rutherford, Major N. J. C., M.B.
 Sampson, Captain P., D.S.O.
 Scott, Captain T. H., M.B.
 Silver, Major J. P., M.B.
 Slayter, Major E. W., M.B.
 Soltau, Lieutenant-Colonel A. B., M.D. (T.F.).
 Stewart, Captain S. J., D.S.O., M.D. (Special Reserve).
 Stewart, Lieutenant (temporary) J. S., M.B.
 Thurston, Major H. S.
 Tyrrell, Lieutenant W., M.B. (Special Reserve).
 Waddy, Lieutenant (temporary) J. R.
 Walker, Major F. S., F.R.C.S.I.
 Walshe, Captain S. J. A. H., M.B. (Special Reserve).
 Watson, Lieutenant-Colonel A. A. (Special Reserve, Lieutenant-Colonel R.A.M.C., T.F.).
 Whitehead, Lieutenant N. T., M.B.
 Williamson, Lieutenant (temporary) J. S.
 Wilson, Captain H. T.
 Winder, Major J. H. R., M.D.
 Wright, Captain W. G.
 Anderson, 10434 Serjeant-Major H. J.
 Arnold, 3586 Private C.
 Barlow, 20528 Staff-Serjeant E.
 Barlow, 4879 Corporal C. W.
 Bethell, 12536 Private B.
 Biggs, 18996 Private A.
 Brogden, 5439 Private E. G.
 Buckner, 14770 Staff-Serjeant A.
 Bunker, 1368 Corporal A.
 Cauty, 8962 Staff-Serjeant A. J.
 Carter, 12751 Serjeant T. B.
 Clements, 1926 Private.
 Dawson, 18912 Quartermaster-Serjeant H.
 Dodsworth, 1339 Private H.
 Edwards, 1530 Private W.
 Elliott, 16399 Quartermaster-Serjeant R.D.
 Fleming, 9515 Serjeant-Major R. J.
 Flynn, 865 Corporal J.
 Forman, 9996 Private R.
 Harper, 10960 Staff-Serjeant A. I.
 Harris, 7353 Private C. A. G.
 Higgins, 960 Private H.
 Hill, 5454 Private T. G.
 Hort, 17319 Serjeant A. T.
 Hubbard, 12441 Serjeant-Major L.

Royal Army Medical Corps—Continued.

Hughes, 5936 Corporal W.	Pepper, 15196 Serjeant C. T.
Humphreys, 3442 Private W.	Pursey, 18158 Staff Serjeant G. P.
Hurley, 6525 Bugler F. W. T.	Robinson, 17714 Serjeant A. R.
Jones, 20151 Private E.	Sams, 18180 Private A. W.
Jones, 11565 Quartermaster-Serjeant J. H.	Sheehan, 11253 Private J.
Jordan, 1642 Private E.	Simmons, 6647 Private J. F.
Lawson, 16442 Serjeant W.	Storey, 11000 Serjeant Major W. H.
Lord, 988 Private E.	Stubbs, 12779 Staff-Serjeant G.
Moffatt, 45 Serjeant T. J.	Unwin, 12790 Private L. P.
Morrison, 12653 Quartermaster-Serjeant F. C.	White, 4443 Serjeant E. H.
Page, 8403 Private T.	Wild, 4152 Private P.
Parr, 18718 Staff-Serjeant W. H.	Wilson, 14686 Staff-Serjeant W. A.
Partridge, 11916 Private E. C.	Woodward, 15022 Serjeant F.

INDIAN ARMY MEDICAL SERVICES (ATTACHED).

Major J. M. Sloan, D.S.O., M.B.	Captain J. B. Jones, M.B.
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EXTRACT FROM "LONDON GAZETTE" OF FEBRUARY 18, 1915.

War Office,

February 18, 1915.

His Majesty the King has been graciously pleased to approve of the undermentioned rewards for Services rendered in connection with Operations in the Field.

To be Surgeon-Generals.

Colonel (temporary Surgeon-General) R. Porter, M.B.
Colonel (temporary Surgeon-General) T. J. O'Donnell, D.S.O.

To be Brevet Lieutenant-Colonel.

Major H. Ensor, D.S.O., M.B.

To be Knight Commander of the Order of the Bath.

Surgeon-General Sir A. T. Sloggett, C.B., C.M.G., K.H.S.

To be Companions of the Order of the Bath.

Surgeon-General T. P. Woodhouse.	Colonel E. H. L. Lynden-Bell, M.B.
Colonel M. W. O'Keefe, M.D.	Colonel S. Hickson, M.B., K.H.S.

To be Companions of the Order of St. Michael and St. George.

Colonel R. H. S. Sawyer, M.B., F.R.C.S.I.	Lieutenant-Colonel G. Cree.
Colonel F. H. Treherne, F.R.C.S.	

The undermentioned officer is awarded the Military Cross:—
Captain F. L. Moss.

ROYAL ARMY MEDICAL CORPS AND MEDICAL SERVICES.*To be Brevet-Colonels.*

Lieutenant-Colonel A. J. Luther.	Lieutenant-Colonel C. B. Lawson, M.B.
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To be Brevet-Lieutenant-Colonels.

Major A. W. Hooper, D.S.O.	Major M. H. G. Fell.
Major E. W. Bliss.	

To be Knights Commanders of the Order of St. Michael and St. George.

Lieutenant-Colonel (temporary Colonel) G. H. Makins, C.B., F.R.C.S. (T.F.).
Lieutenant-Colonel (temporary Colonel) Sir A. A. Bowlby, C.M.G., F.R.C.S. (T.F.).

To be Companions of the Order of the Bath.

Surgeon-General W. G. Macpherson, C.M.G., K.H.P., M.B.
Colonel F. W. C. Jones, M.B.
Brevet-Colonel Sir W. B. Leishman, K.H.P., F.R.S., M.B., F.R.C.P.
Colonel (temporary) Sir J. R. Bradford, K.C.M.G., F.R.S., M.D. (T.F.).

To be Companions of the Order of St. Michael and St. George.

Lieutenant-Colonel G. H. Barefoot.	Lieutenant-Colonel G. S. McLoughlin,
Lieutenant-Colonel (temporary Colonel) C. H. Burtchaell, M.B.	D.S.O., M.B.
Lieutenant-Colonel L. T. M. Nash.	Major G. T. K. Maurice.
Lieutenant-Colonel B. Forde, M.B.	Major E. T. F. Birrell, M.B.

To be Companions of the Distinguished Service Order.

Major H. R. Bateman.	Major V. J. Crawford.
Major C. R. Evans.	Major A. C. Fox.
Major C. M. Goodbody.	Major G. J. A. Ormsby, M.D.
Major L. W. Harrison, M.B.	Major N. J. C. Rutherford, M.B.
Major H. L. W. Norrington.	Captain A. G. Wilson, M.B., F.R.C.S.
Major F. A. Stephens.	Captain S. J. A. H. Walshe, M.B.
Major F. A. Symons, M.B.	Captain E. T. Potts, M.D.

Awarded the Military Cross.

Captain C. Kelly, M.D.	Lieutenant F. C. Davidson, M.B.
Captain E. C. Phelan, M.B.	Temporary Lieutenant E. W. Carrington,
Captain W. B. Purdon, M.B.	M.B.
Captain T. H. Scott, M.B.	Lieutenant T. H. Balfour, M.B.
Temporary Lieutenant J. R. Waddy.	11000 Serjeant-Major W. H. Storey.
Lieutenant W. Tyrrell, M.B.	9515 Serjeant-Major R. J. Fleming.
Lieutenant W. McK. H. McCullagh, M.B.	14461 Serjeant-Major A. Baker.
Temporary Lieutenant W. W. Ingram,	14050 Serjeant-Major A. Bennett.
M.B.	11509 Serjeant-Major J. J. Earp.
Lieutenant J. FitzG. Gwynne, M.B.	10892 Serjeant-Major H. J. Reeve.

To be Honorary Captain.

Quartermaster and Honorary Lieutenant E. J. Buckley.

INDIAN ARMY MEDICAL SERVICES (ATTACHED).*To be Brevet Lieutenant-Colonel.*

Major J. M. Sloan, D.S.O., M.B.

Clasp to Victoria Cross.

Lieutenant Arthur Martin Leake, R.A.M.C., who was awarded the Victoria Cross on May 13, 1902, is granted a Clasp for conspicuous bravery in the present campaign :—

For most conspicuous bravery and devotion to duty throughout the campaign, especially during the period October 29 to November 8, 1914, near Zonnebeke, in rescuing, whilst exposed to constant fire, a large number of the wounded who were lying close to the enemy's trenches.

His Majesty the King has been graciously pleased to confer the Military Cross on the undermentioned officer :—

Captain William Francis Mary Loughnan, R.A.M.C. For gallantry on many occasions in Flanders in assisting to rescue the wounded whilst exposed to heavy fire.

The King has been graciously pleased to approve of the appointment of the undermentioned officer to be a Companion of the Distinguished Service Order, in recognition of his gallantry and devotion to duty whilst serving with the Expeditionary Force :—

Lieutenant Edmund Hume Moore, M.B., R.A.M.C., attached 2nd Battalion Leicester Regiment.

For conspicuous gallantry on February 23, near Richebourg l'Avoue, in going out with another officer and a stretcher-bearer to within 150 yards of the enemy and attending to a severely wounded soldier. The stretcher-bearer was then wounded, and Lieutenant Moore remained in attendance on him, undoubtedly saving his life.

On the next day this officer again went, with the greatest gallantry, to the assistance of a wounded man under the aimed fire of the enemy. He dressed the man's wounds, and was immediately afterwards wounded himself.

His Majesty has been graciously pleased to confer the Military Cross on the undermentioned officer in recognition of his gallantry and devotion to duty whilst serving with the Expeditionary Force:—

Lieutenant T. W. Clarke, M.B., R.A.M.C., Special Reserve.

For conspicuous gallantry and great devotion to duty during the past six months. On March 5, at Neuve Eglise, when the 14th Field Ambulance dressing station was destroyed by shell fire (one officer and five men being killed and nineteen wounded therein), Lieutenant Clarke continued to attend to the wounded with great gallantry until he collapsed from his own wound (which he received from the first shell).

War Office,
April 15, 1915.

His Majesty the King has been graciously pleased to approve of the appointment of the undermentioned officer to be Companion of the Distinguished Service Order, in recognition of his gallantry and devotion to duty whilst serving with the Expeditionary Force:—

Lieutenant (temporary) James Robertson Campbell Greenlees, M.B., 22nd Field Ambulance, Royal Army Medical Corps.

For his gallantry and devotion to duty at Neuve Chapelle from March 10 to 14, 1915, in attending on the wounded under very heavy fire.

Lieutenant Greenlees has been twice previously brought to notice for similar acts of gallantry.

His Majesty the King has been graciously pleased to confer the Military Cross on the undermentioned officer in recognition of his gallantry and devotion to duty whilst serving with the Expeditionary Force:—

Lieutenant J. G. Priestly, M.B., R.A.M.C.

For gallantry and devotion to duty at Neuve Chapelle, on March 13, 1915, when he continued attending on the wounded with great gallantry, although himself badly wounded.

ARMY MEDICAL SERVICE.

Lieutenant-Colonel Albert L. F. Bate, from Royal Army Medical Corps, to be Colonel, dated March 1, 1915.

ROYAL ARMY MEDICAL CORPS.

The undermentioned Lieutenants to be Captains:—

Alexander G. Biggam, M.B.; Roy K. Hallam, M.B.; William McNaughtan, M.B.; David T. M. Large, M.B.; Walter W. Pratt, M.B.; William F. Christie, M.B.; Maurice Burnett; Alexander Hood, M.B.; Edward A. Strachan, M.B.; Cuthbert J. Blaikie; James H. M. Frobisher, M.B.; Walter B. Stevenson, M.B.; John L. Ritchie, M.B.; David T. Richardson, M.B.; Owen W. J. Wynne; Christopher M. Ingoldby; Sydney J. Higgins; Gilbert A. Blake, M.B.; Percy A. With; Cuthbert J. H. Little, M.B.; Stephen J. Barry; Robert W. Vint, M.B.; Henry R. L'Estrange; Harold W. L. Allott; Edward P. A. Smith, M.B.; Robert B. Price, M.B.; James B. A. Wigmore; John Hare, M.B.; Robert A. Flood, M.B.; Eric C. Lang, M.B.; William V. Corbett; Leopold T. Poole, M.B.; Thomas H. Balfour, M.B.; Frank C. Cowtan; Charles C. Jones, M.B.; Edward V. Whitby, M.B.; Edmund U. Russell; Robert G. Shaw, M.B.; Norman W. Stevens, M.B.; Richard B. Phillipps; Alexander L. Urquhart, M.B.; Noel T. Whitehead, M.B.; James C. Sproule; Avenell F. C. Martyn; George F. Allison; Robert C. Carlyle, M.B.; John E. Hepper; Arthur A. M. Davies; Leslie Dunbar, M.B.; Henry F. Pantom, M.B.; Henry Beddingfield, D.S.O., M.B.; Frederick C. Davidson, M.B.; Stanley D. Large; Cyril Helm; Humfrey N. Sealy; Albert Jackson; Edward C. Beddows; George E. Dyas; Conyngham V. Thornton, M.B.; John Rowe, M.B.; William P. Croker, M.B.; Arthur B. H. Bridges; Aubrey G. Brown, M.B.; Percival D. Warburton; Robert Hemphill, M.B.; Summer H. Smith; Ernest W. Wade, M.B.; Bernard Woodhouse; William K. Morrison, M.B.; Edgar Percival, M.B.; Henry C. D. Rankin, M.B.; Treffry O. Thompson, M.B.; Stanley J. Linzell, M.B.; Lewis R. Shore; Allan Watson, M.B.; Norman V. Lothian, M.B.; John G. Gill, M.B.; Sidney M. Hattersley, M.B.; John W. C. Stubbs, M.B.; Arthur J. A.

Menzies, M.B.; John FitzG. Gwynne, M.B.; Thomas F. P. Breen, M.B.; David C. G. Ballingall, M.B.; Herbert G. Winter; James M. Evatt; Francis G. Thatcher, M.B.; William P. Mulligan, M.B.; Gerard P. Selby; John G. Butt, M.B.; Neil Cantile, M.B.; Edward A. P. Brock; Percival T. Priestley, M.B.; Edward Phillips, M.B.; Spence D. Reid, M.B.; Peter J. Ryan, M.B., Barcroft J. L. Fayle; Evelyn A. Sutton.

The undermentioned to be temporary Lieutenants:—

- Dated December 20, 1914.—Frederic Samuel Rowland.
 Dated February 8, 1915.—Wilfred George Mumford, M.B., F.R.C.S.
 Dated February 12, 1915.—John Robert Askew, F.R.C.S.
 Dated February 13, 1915.—Edward Burton Gunson, M.D.
 Dated February 21, 1915.—Stephen John Henry, M.B.
 Dated February 22, 1915.—Robert John McNeill Love, M.B.
 Dated February 23, 1915.—Philip Wolfe McKeag, M.B.; George James Bowen; Alexander Paterson, M.B.; William Stephen Baird, M.B.; Joseph McCulloch, M.B.; Colin Hunter; Ernest William Henderson Cruickshank, M.B.; Frederick Durnford Atkins, M.B.; James Turner Gunn, M.B.; David Sands Brough, M.B.; James Robertson Murray, M.D.
 Dated February 24, 1915.—Clement Treves Neve, M.B., F.R.C.S.; Victor James Woolley, M.D.; Theodore Scott; Joseph Henry Creasy Davis.
 Dated February 25, 1915.—Harold Gordon Oliver; John Jones Crawford, M.D.; Alexander William Crawford Lindsay; James McDonnell; John Sutherland Taylor.
 Dated February 26, 1915.—Thomas Cyril Cregan; Roderick Alexander Steven; Lionel Pern; Frederick John Stephenson, M.D.
 Dated February 27, 1915.—Lionel Richard Gethin de Glanville; Felix Edward Ricardo Laborda.
 Dated February 28, 1915.—Arthur Wellington Matthew.
 Dated March 1, 1915.—Alexander Fraser, M.B.; George Douglas Cairns, M.B.; Arthur Paul Saint; Bernard Beaumont Westlake; George Mellersh Jones; Sidney Kendrick Vines; Hugh Trebarne Lewellyn Roberts; Wilfred Parsons; Abraham Ellenbogen Ellis; Andrew Tocher Cunningham, M.B.; Samuel Alexander Montgomery, M.B.; Samuel Fleming; Edward Stokes Hall; George Herbert Alabaster, M.B.; William James Lascelles; Andrew Finlay Readdie; Christopher Sullivan, F.R.C.S.I.; Alexander Gordon MacLeod, M.B.; Ernest Aston Otho Travers; Arthur Clarence; Turner; Reginald Herman Tribe; John Ross MacNeill; Robert Macfie Johnston; Edward Charles Dutton; Philip Carney; Edgumbe Wentworth Moore, M.B.
 Dated March 3, 1915.—William Fletcher, M.D.; Royden McIntosh Muir, M.B. Francis Crombie Macaulay, M.B.; Edgar Wilmot Smerdon, M.D. Edin., F.R.C.S. George Fox; Frank Henry Parsonage; Douglas Wain; George Joseph Adams, M.B., F.R.C.S. Edin.; Clement John Lethbridge Wells.
 Dated March 5, 1915.—Alfred Hartwell Conder; Kennett Robinson, M.B.
 Dated March 6, 1915.—John Hawkins Askins, M.B.; Frank William Weeley, M.D.; John Gordon Harris.
 Dated March 7, 1915.—Frederic Percy Joscelyne, M.D.
 Dated March 8, 1915.—George Stanley Deane; Henry Hawes Elliot, M.B.; Roy Henry Rollinson-Whitaker, F.R.C.S.; Alan Filmer Rook; John Sullivan, M.B.; Harold Saunderson Sugars, M.B.; Francis Gordon Bell, M.D., F.R.C.S.; Frederick Orlando Clarke, M.B.; James Keenan, F.R.C.S.I.; Sydney Granville Tibbles; John Henry Tomlinson; Robert Lacy Kitching; Alexander Stanger Seabrooke, M.B.; John Thomas Heffernan; Horace Fitzgerald Blood; Eric Morse Townsend.
 Dated March 9, 1915.—Arthur Bloom; Hubert Lewis Clifford Noel; Vernon John Thurston.
 Dated March 10, 1915.—Oswald Herbert Edwards: Francis Irvine, M.B.; Walter Smithies; Henry Harvard Davis, F.R.C.S. Edin.; Walter Charles Campbell Kirkwood, M.B.; Charles Ernest Sundell, M.D.; John Dugald MacEwen, M.B., F.R.C.S. Edin.; John Rodley Stack, M.B.; Alfred Wallace Harvey; Timothy Sheehan; Alan Wiley; Francis Swanson Hawks; James Anderson Hutchinson; John Helby Wilkinson; Frederick Henry Rudge; Norman Gerald Horner, M.B.
 Dated March 11, 1915.—Douglas Compton Taylor, M.B., F.R.C.S.
 Dated March 21, 1915.—William Parry Morgan, M.B.; Charles W. G. Bryan, F.R.C.S.
 Temporary Quartermaster and Honorary Lieutenant W. A. Brunt, Home Hospitals Reserve, relinquishes his commission, dated March 19, 1915.

The undermentioned to be temporary Quartermasters, with the honorary rank of Lieutenant :—

Dated December 12, 1914.—Philip Stephens Thompson.

Dated February 9, 1915.—Alfred Francis Morris.

Dated March 3, 1915.—John Lewis Driver.

Dated March 12, 1915.—John Forman, Charles William Beaumont.

Dated March 13, 1915.—Edward Hunt, Edward Charles Bowen.

Dated March 16, 1915.—William Henry Crockram.

Dated March 17, 1915.—Charles William Hook, John Ferraro.

Dated March 19, 1915.—Frederick Stanley Marsland.

Temporary Quartermaster and Honorary Lieutenant Richard Cody Rowan, relinquishes his commission on account of ill-health, dated March 12, 1915.

DISTINGUISHED CONDUCT MEDALS.

His Majesty the King has approved of the grant of the Medal for Distinguished Conduct in the Field to the undermentioned Non-commissioned Officers and men for acts of gallantry and devotion to duty whilst serving with the Expeditionary Force.

(Army Order No. 22 of January, 1915.)

No. 9939 Private H. Burns.

For conspicuous gallantry in remaining in an evacuated dressing station, tending dangerously wounded men under continuous fire for forty-eight hours. The position was subsequently recaptured and the wounded men saved.

No. 934 Private T. Giles (now Corporal).

Highly commendable conduct on October 26, when he helped to carry the wounded from collecting station to ambulance wagon over fire-swept ground several times. Since then he has taken up stretcher squads to remove the wounded from battery in action. Has constantly performed good work.

No. 18722 Private J. J. Leach.

For exceptionally good work at the dressing stations at Bucy Le Long and St. Marguerite during the bombardment of September 14 to 18.

No. 669 Private T. A. Marlborough.

Highly commendable conduct on October 26, when he helped to carry a wounded officer and men from collecting station to ambulance wagon over fire-swept ground several times. Has performed consistently good work during the campaign.

No. 7191 Private R. Mears.

For exceptionally good work at dressing stations at Bucy Le Long and St. Marguerite during the bombardment of September 14 to 18.

The Director-General in recognition of the credit which these gallant actions reflect on the individuals concerned and on the Corps, has directed that these men shall be promoted to the rank of Corporal as vacancies occur.

His Majesty the King has been pleased to approve of the grant of the Medal for Distinguished Conduct in the Field to the undermentioned Non-commissioned Officers and men, for acts of gallantry and devotion to duty.

(Special Army Order dated January 19, 1915.)

No. 20101 Serjeant J. L. Barnfield.

For conspicuous gallantry in leading his stretcher bearers in a fearless manner under fire in darkness, collecting the wounded, especially at La Boutillerie on October 24.

No. 8559 Private H. Hallamore.

For conspicuous gallantry and devotion to duty on numerous occasions between October 22 and November 20, in rendering aid to the wounded, making journeys constantly under very heavy fire.

No. 11347 Private F. J. Holroyd.

For gallantry and devotion to duty between October 31 and end of November, in collecting the wounded at night in the neighbourhood at Veldhoek.

No. 115 Serjeant A. E. Joseph.

For gallantry and devotion to duty between October 31 and November 17, in collecting the wounded at night in the woods near Veldhoek.

No. 8859 Private A. H. Lucas.

For conspicuous gallantry and devotion to duty on numerous occasions between October 22 and November 20, in rendering aid to the wounded, making journeys constantly under very heavy fire.

No. 4570 Private F. Marshall.

For conspicuous gallantry and devotion to duty on numerous occasions between October 22 and November 20, in rendering aid to the wounded, making journeys constantly under heavy fire.

No. 4439 Private W. J. Mathews.

For gallant conduct and devotion to duty, in collecting the wounded under shell fire, especially on November 1 near Zillebeke, where he was severely wounded.

No. 14741 Private R. H. Mills.

For gallant conduct in searching for wounded men, on his own initiative, in a house which was being shelled by the enemy.

No. 8637 Private H. J. Ranger.

For conspicuous gallantry and devotion to duty on numerous occasions between October 22 and November 20, in rendering aid to the wounded, making journeys constantly under very heavy fire.

No. 15022 Serjeant F. Woodward.

For conspicuously gallant conduct on November 2, near Hemmel, when he continued to attend on the wounded, although a shell had burst in the room in which they lay, and he had been stunned by the concussion.

The Director-General, in recognition of the credit which these gallant actions reflect on the individuals concerned, and on the Corps, has directed that these men (privates) shall be promoted to the rank of Corporal as vacancies occur.

His Majesty The King has approved of the grant of the Medal for Distinguished Conduct in the Field to the undermentioned Non-commissioned Officers and men for acts of gallantry and devotion to duty whilst serving with the Expeditionary Force.

(Army Order, No. 471 of December, 1914.)

No. 2953 Private J. Jonas.

For bravery on September 14 at Pont Arcy in carrying in, under a heavy fire, Serjeant Stansfield, 49th Battery, Royal Field Artillery, who was dangerously wounded.

(Army Order, No. 484 of December, 1914.)

No. 14865 Private N. Freshwater.

For gallantry on October 22 in leading a party of stretcher-bearers in daylight, under heavy rifle fire for a quarter of a mile, to bring back a wounded serjeant.

No. 434 Private J. Kendrick.

For gallantry and devotion in remaining in a small house in charge of two wounded men of the King's Royal Rifle Corps, and five very badly wounded Germans whom it was impossible to remove. After giving all his rations and water from his water-bottle to the wounded, he proceeded to the nearest outpost, under fire, in an endeavour to obtain more water for them.

DECORATIONS.

The President of the French Republic has bestowed the decoration "Médaille Militaire" on the undermentioned Warrant Officers, Non-commissioned Officers and men of the Expeditionary Force, with the approval of His Majesty The King, in recognition of their gallantry during the operations between August 21 and 30, 1914.

(Army Order, No. 466 of December, 1914.)

No.	Rank and Name			Remarks
10059	Serjt.-Major	Carnell, G. W.	(S.R.)
17843	Qmr.-Serjt.	Blair, R. C.	.. ..
11874	Private	Faun, H.	.. ..
1256	"	Goodfellow, A.	.. ..
10659	Serjt.-Major	Hasler, A. T.	.. ..
10599	Private	Jupp, H. G.	.. ..
10166	Serjt.-Major	Loft, E. R.	.. ..
1305	Serjeant	Prince, H. H.	.. ..
7471	Private	Sworn, A. V.	.. ..

LONDON GAZETTE.

The following notification appeared in the *London Gazette* of September 1, 1914:—

WARRANT OFFICERS, N.C.O.'S AND MEN.

(a) The names of the following Warrant Officers, N.C.O.'s and men, Royal Army Medical Corps, were mentioned in the Dispatch from the Field Marshal Commanding-in-Chief, British Forces in the Field, which was published in the *London Gazette*, No. 29,072, of February 16, 1915:—

No. 10134	Serjt.-Maj.	Anderson, H. J.	No. 2189	Serjeant	Munden, J. W. F.
" 14461	"	Baker, A.	" 15196	"	Pepper, C. T.
" 9929	"	Banks, J.	" 17714	"	Robinson, A. R.
" 11225	"	Bennett, A.	" 18873	"	Spiers, W. J.
" 9940	"	Davis, F.	" 4443	"	White, E. H.
" 11509	"	Farp, J. J.	" 15022	"	Woodward, F.
" 9515	"	Fleming, R. J.	" 4879	Corporal	Barlow, C. W.
" 12441	"	Hubbard, L.	" 1368	"	Bunker, A.
" 14464	"	Hurran, G. F.	" 1972	"	Davidson, B.
" 14705	"	Muirhead, W. A.	" 4961	"	Day, A.
" 10892	"	Reeve, H. J.	" 865	"	Flynn, J.
" 14663	"	Snow, P.	" 18131	"	Greenhalgh, W.
" 11000	"	Storey, W. H.	" 5936	"	Hughes, W.
" 18913	Qmr.-Serjt.	Dawson, H.	" 17179	"	McEnnery, T.
" 19021	"	Dell, A. A.	" 4973	"	Tunnicliffe, T. A.
" 16399	"	Elliott, R. D.	" 3586	Private	Arnold, C.
" 11946	"	Gosling, E. J.	" 18026	"	Barnes, C. A.
" 11565	"	Jones, J. H.	" 12536	"	Bethell, B.
" 10690	"	Le Poidevin, P.	" 18996	"	Biggs, A.
" 12653	"	Morrison, F. O.	" 5439	"	Brogden, E. G.
" 12104	"	Newton, J. E.	" 1926	"	Clements, H.
" 10895	"	Perritt, W. E.	" 1339	"	Dodsworth, H., Spec.Res.Cat. "A."
" 16047	"	Springett, D.	" 9906	"	Forman, R.
" 20528	Staff-Serjt.	Barlow, E., Spec. Res. Cat. "B."	" 7353	"	Harris, C. A. G.
" 12989	"	Barnes, E. G. W.	" 960	"	Higgins, H.
" 18415	"	Bell, A.	" 5454	"	Hill, T. G.
" 14770	"	Buckner, A.	" 3442	"	Humphreys, W.
" 8962	"	Canty, A. J.	" 20151	"	Jones, E., Spec. Res. Cat. "B."
" 10420	"	Currie, A. W.	" 1642	"	Jordan, E.
" 12617	"	Edwards, J. R.	" 988	"	Lord, E., Spec.Res. Cat. "A."
" 10960	"	Harper, A. I.	" 8403	"	Page, T.
" 16482	"	Leppington, W. C.	" 11916	"	Partridge, E. C.
" 18718	"	Parr, W. H.	" 6507	"	Robinson, F.
" 18158	"	Pursey, G. P.	" 18180	"	Sams, A. W.
" 12779	"	Stubbs, G.	" 11253	"	Sheehan, J.
" 14686	"	Wilson, W. A.	" 6647	"	Simmons, J. F.
" 12751	Serjeant	Carter, T. B.	" 12790	"	Unwin, L. P.
" 18507	"	Gerrie, W. A.	" 3878	"	Vogel, W. H.
" 17319	"	Hort, A. T.	" 4152	"	Wild, P.
" 19102	"	Hughes, H. C.	" 6525	Bugler	Hurley, F. W. T.
" 16442	"	Lawson, W.			
" 45	"	Moffatt, T. J.			

LONDON GAZETTE.

The names of the following Warrant Officers, Non-commissioned Officers and men, Royal Army Medical Corps, were mentioned in the despatch from the Field Marshal Commanding the Expeditionary Force, which was published in the *London Gazette*, No. 28942, of October 19, 1914:—

No.	Rank and Name		Remarks
10434	Serjt.-Major	Anderson, H. J. ..	
11141	"	Coggon, T. W. ..	
8991	"	Cox, R. ..	
10659	"	Hasler, A. T. ..	
10166	"	Loft, E. R. ..	
13856	"	McKay, R. J. ..	
8268	Qmr.-Serjt.	Walker, G. B. ..	Now Serjeant-Major.
17568	"	Steele, E. ..	
17843	Staff-Serjt.	Blair, R. C. ..	Now Qmr.-Serjeant.
11224	"	Rayer, A. T. ..	"
11029	"	Spowage, A. ..	"
12890	"	Gardiner, S. J. ..	
16751	"	Leighton, J. ..	
16002	Serjeant	Amsden, H. W. ..	
19032	"	Cooke, J. ..	
19401	"	Harland, A. E. ..	
15538	"	Jessen, E. H. ..	
1116	"	Lockwood, J. W. ..	
12485	"	Nicholas, E. ..	
1305	"	Prince, H. M. ..	
	"	Sadler, G. ..	
18657	"	Tripp, V. ..	
2226	Corporal	Chatting, F. J. ..	Now Serjeant.
809	"	Rowland, T. ..	"
17250	Lce.-Serjt.	Hobbs, A. ..	
6398	Corporal	Coad, R. H. ..	
19236	"	Pettit, J. F. ..	
17421	"	Plume, P. ..	
20102	"	Price, W. R. ..	(Spec. Res. Cat. "B.")
6691	Private	Annett, J. ..	
5632	"	Barnby, W. P. ..	
6350	"	Bennett, T. ..	
	"	Burstall, A. ..	
12283	"	Carter, W. ..	
4185	"	Cuffley, B. ..	
19199	"	Deane, W. D. ..	
11874	"	Faun, H. ..	
19101	"	Flaxman, W. A. ..	
4601	"	Ginman, L. H. ..	
6617	"	Goodwin, R. A. ..	
12953	"	Jena, J. ..	
19722	"	Leach, W. J. J. ..	
7191	"	Mears, R. ..	
19103	"	Noble, H. G. ..	
	"	Stephens, G. ..	
8292	"	Sloan, J. W. ..	
7471	"	Sworn, A. V. ..	
18189	"	Wass, A. ..	

PROMOTIONS.

The following promotions, to complete War Establishment on Mobilization, will take effect from the dates specified:—

To be Serjeant-Majors.

No.	Rank and Name	Date	Remarks
10338	Qmr.-Serjt. Darke, G. J.	12.10.14	
10254	" Gillespie, A.	"	
9248	" Truman, A. C.	"	
8268	" Walker, G. B.	"	
8994	" Kingston, C.	"	
10221	" Larner, E.	"	
9215	" Holden, A.	"	
10510	" Eldergill, W. T.	"	
8269	" Gibbs, G. A.	"	
9360	" Horne, A.	"	
10431	" Underwood, H.	"	
10665	" Angell, H. J.	"	
8947	" Hicks, W.	"	
10711	" Sharpe, F. W.	"	
10573	" Chudleigh, W. H.	"	
10073	" Merchant, W.	"	
11353	" Lackey, M. E.	"	
11627	" Secker, H.	"	
11223	" Hampton, J. F.	"	
10296	" Bangert, H. A.	"	
11082	" Fraser, J.	"	
12146	" Wilson, W. J.	"	
11049	" Ulph, W. T. A.	"	
10166	" Loft, E. R.	"	
12023	" Morris, S. C.	12.12.14	
12441	" Hubbard, L.	"	
10912	" McMahon, J. H.	"	
14464	" Hurran, G. F.	"	
11613	" Morris, G. R.	"	
15948	" Christie, G. D.	"	
14663	" Snow, P.	"	
12522	" Gallie, S.	8.1.15	
11320	" Watts, R.	20.1.15	
12434	" Fallett, R. B.	"	
16177	" Robinson, A. F.	"	
16287	" Saunders, W. E.	"	
16573	" Nichol, R. S.	"	
15721	" Odell, A. E.	"	
11020	" Lavis, W.	"	

To be Quartermaster-Serjeants.

5081	Staff-Serjt.	Parton, F. S.	12.10.14
7711	"	Green, A. C.	"
6366	"	Cotter, J.	"
9632	"	Baxter, J.	"
10200	"	Thomas, J. H.	"
10142	"	Cardwell, T. W.	"
8938	"	Caseley, F.	"
7679	"	Warner, C.	"
9375	"	Allford, W.	"
9033	"	Medwell, A.	"
	"	Malyon, C.	"

To be Quartermaster-Serjeants—Continued.

No.	Rank and Name	Date	Remarks
9587	Staff-Serjt. Connell, J.	12.10.14	
10690	" Le Poidevin, P.	"	
8287	" Maitland, W. E.	"	
8288	" Andrews, M.	"	
10895	" Perritt, W. E.	"	
10183	" James, W. J.	"	
11843	" Baxendale, J.	"	
10849	" Richmond, C. E. T.	"	
10276	" Bird, F.	"	
10721	" Smith, A.	"	
8886	" Sparrow, E. E.	"	
11626	" Easey, H. J.	"	
11224	" Rayer, A. T.	"	
11029	" Spowage, A.	"	
11403	" Wagstaffe, P. E.	"	
9578	" Dawson, W.	"	
10950	" Virgo, H. V.	"	
8714	" Walsh, A. S.	"	
10005	" Hughes, W. T.	"	
12495	" Brewer, T. H.	"	
10736	" Gray, G. E.	"	
9457	" Griffiths, W.	"	
15634	" Drummond, W. H. E.	"	
12510	" Redwood, F. J.	"	
11116	" Thomas, G. E.	"	
11089	" Flint, F. S.	"	
11952	" Malley, A. E.	"	
17843	" Blair, R. C.	"	
10442	" Dunghison, C.	"	
12626	" Heald, H.	"	
17759	" Black, J.	5.12.14	
10518	" Brice, E. G. I.	12.12.14	
8477	" Gregson, G. G.	"	
12620	" Kirby, T.	"	
12377	" Aldhous, B. L.	"	
11523	" Shaw, H.	"	
11527	" Prewett, T. C.	"	
12743	" Wilson, T. R.	"	
11583	" McCarthy, W.	"	
12732	" Hughes, F.	"	
12104	" Newton, J. E.	"	
16359	" Elliott, R. D.	20.1.15	
14958	" Seady, H.	"	
10540	" Bottomley, G.	"	
11318	" Dewar, H. F.	"	
12890	" Gardiner, J. S.	"	
10598	" Knightley, P. G.	"	
11211	" Marsden, L. T.	"	
12815	" Burgess, G.	"	
14465	" Cottey, R.	"	
15955	" Miller, H. G.	"	
14335	" Cameron, J.	"	
12280	" Endacott, A.	"	
12519	" Halford, R. E.	"	
19621	" Dell, A. A.	"	
15980	" Anderton, A. G.	"	
12248	" Gamblen, W.	"	
10458	" Langston, W.	"	
12047	" Springett, P.	"	
12158	" Strange, E. J.	"	
13087	" Sparks, F.	"	

To be Staff-Serjeants.

No.	Rank and Name		Date	Remarks
10420	Serjeant	Currie, A. W.	12.10.14	
12535	"	Oliver, T. E.	"	
15001	"	Hurst, W.	"	
12033	"	Ross, W.	"	
16564	"	Vickers, C.	"	
12676	"	Young, E. A.	"	
11734	"	Campion, A. H. O.	"	
	"	Scott, W.	"	
9975	"	Partridge, J. E.	"	
	"	Tyler, H. E.	"	
13294	"	Avery, W. F.	"	
17736	"	Keeble, J. D.	"	
13814	"	Kenneally, P.	"	
14558	"	Wells, H.	"	
17632	"	Lunn, H. C. A.	"	
17730	"	Wills, P.	"	
10336	"	Howell, F. J.	"	
18890	"	Moore, J.	"	
11513	"	Hinton, G.	"	
12002	"	Knee, W. J.	"	
10965	"	Howlett, J.	"	
17022	"	Weaver, A. R.	"	
17542	"	Colgan, R.	"	
11741	"	Hudson, H.	"	
10076	"	Brown, W. H.	"	
	"	Parsons, H. G.	"	
	"	Todd, J.	"	
10955	"	Rowe, J. H.	"	
15648	"	Hill, E. J.	"	
18717	"	Hart, C. H.	"	
18463	"	Day, F. W.	"	
17485	"	Kennedy, H.	"	
18032	"	Burns, J. I.	"	
13555	"	Allen, W. J.	"	
18170	"	Sufrin, L.	"	
12185	"	Willis, A. S.	"	
14210	"	Fulton, J.	"	
9454	"	Girling, A. N.	"	
14072	"	Benham, R. R.	"	
18213	"	Pacey, W. C.	"	
12768	"	Kent, T. R.	"	
12187	"	Brookes, J. A.	"	
14686	"	Wilson, W. A.	"	
12819	"	Riches, W. H.	"	
14924	"	Forbes, J. E. A.	"	
11929	"	Cooper, W. J.	"	
	"	Hutchinson, W.	"	
11624	"	Catherall, W.	"	
13921	"	Cooper, J. W.	"	
15783	"	Lloyd, E. F. H.	"	
15848	"	Garbett-Burbidge, A. E.	"	
12302	"	Whyte, W.	"	
12411	"	Sims, A. A.	"	
12651	"	Bennett, R. H.	12.12.14	
14356	"	Vyse, W. L.	"	
16002	"	Amsden, H. W.	"	
14209	"	McCune, A.	"	
16190	"	Cowling, J. R.	"	

To be Staff-Serjeants—Continued.

No.	Rank and Name	Date	Remarks
11275	Serjeant Breewood, A. ..	12.12.14	
14706	" Cairns, J. ..	"	
14334	" Rose, S. ..	"	
16304	" Langley, A. ..	"	
12669	" Grinham, C. W. ..	"	
16130	" Lacey, W. ..	"	
11440	" Farmer, A. ..	"	
16247	" Freeman, E. S. ..	"	
16325	" Gibbs, A. F. ..	"	
16446	" Whitehead, W. ..	"	
10861	" Cleare, G. ..	"	
10808	" Burden, H. S. ..	"	
12557	" Harvey, P. ..	"	
18433	" Shaw, J. A. ..	"	
13810	" West, S. ..	"	
17409	" Kimberley, H. ..	"	
12592	" Fraser, J. G. ..	"	
14797	" Cooke, J. E. ..	"	
16756	" Brown, N. W. ..	"	
12496	" McKay, J. ..	"	
14580	" Gurnsey, S. R. ..	"	
17427	" Higgins, L. ..	"	
11712	" Kilyon, J. ..	"	
12756	" Jones, F. H. ..	"	
16917	" Fish, A. ..	"	
17060	" Reeves, S. ..	"	
17541	" McConn, P. ..	"	
	" Harlen, C. ..	20.1.15	
	" Stroud, J. ..	"	
	" Russell, E. J. ..	"	
17257	" Bartlett, J. J. ..	"	
	" Harvey, R. E. ..	"	
10926	" Dover, E. ..	"	
	" Turpin, A. G. ..	"	
12485	" Nicholas, E. ..	"	
	" Humphries, J. W. ..	"	
	" Rogers, F. ..	"	
12466	" Grogan, J. ..	"	
15996	" Griffin, W. H. ..	"	
	" Ward, H. C. ..	"	
12052	" Halkett, F. C. ..	"	
15698	" Collier, H. C. F. ..	"	
	" Hunter, J. ..	"	
11908	" Prior, A. ..	"	
12947	" Henderson, M. ..	"	
17413	" Tweed, E. ..	"	
17465	" Bell, J. ..	"	
17450	" Elsey, W. J. ..	"	
19322	" Elliott, H. ..	"	
19396	" Baker, H. ..	"	
586	" Gordon, W. A. ..	"	
12275	" Querce, P. M. ..	"	
11033	" Chrisp, A. ..	"	
16769	" Cole, C. F. ..	"	
751	" Milne, A. J. ..	"	
19924	" Barr, E. D. ..	"	
11815	" Austin, G. A. ..	"	
17368	" Skermell, J. E. ..	"	

To be Staff-Serjeants—Continued

No.	Rank and Name	Date	Remarks
14888	Serjeant	Currell, H.	20.1.15
16447	"	Ashworth, J. W.	"
14402	"	Ranford, J. W.	"
15537	"	Booth, F.	"
11794	"	Gardener, W. S.	"
16482	"	Leppington, W. C.	"

To be Serjeants.

13725	Corporal	Loweth, I.	12.10.14
19347	"	White, A. J.	"
19261	"	Croft, A. T.	"
15764	"	Elison, G.	"
1359	"	Collier, W. N.	"
1406	"	Newland, F. H.	"
1825	"	Williams, A. G.	"
672	"	Stevens, A.	"
1118	"	Reeves, H. W.	"
4895	"	Gill, W. H.	"
19916	"	Garroll, H. J.	"
73	"	Ellard, F.	"
1061	"	Davey, W. H.	"
1974	"	Ferguson, C. D.	"
1919	"	Vyse, F. H.	"
911	"	Clough, W.	"
1302	"	Jack, J.	"
1344	"	Shelley, W. C.	"
1475	"	Bamford, W. J.	"
2106	"	Macdonald, J.	"
19917	"	Cate, A.	"
2102	"	Catton, F. T.	"
19997	"	Tilby, R. J.	"
22	"	Church, W. R.	"
26	"	Bax, F.	"
29	"	Hart, J.	"
95	"	Thomas, A. G. W.	"
113	"	Powell, J. D.	"
1842	"	Davis, H.	"
1569	"	Farmer, G. L.	"
4357	"	Harding, T. H.	"
193	"	Truscott, H. P.	"
196	"	Kent, A. J.	"
223	"	Peake, W.	"
226	"	Wilks, A. H.	"
276	"	Baldwin, T. D.	"
470	"	Claridge, H. A.	"
501	"	Benson, O.	"
570	"	Crook, G. B.	"
590	"	Gilbert, F. C.	"
1112	"	Sheehan, J.	"
1070	"	Brunt, W. J. G.	"
6231	"	Martin, P. J.	"
6313	"	Smith, H. G.	"
7066	"	McCarthy, F. B.	"
809	"	Rowland, T.	"
943	"	Ball, A. H.	"
954	"	Hallott, H. C.	"
1869	"	Brason, R.	"

To be Sergeants—Continued.

No.	Rank and Name	Date	Remarks
1076	Corporal	Powden, F. C. ..	12.10.14
19449	"	Charles, W. ..	"
5442	"	Woodward, A. E. ..	"
5015	"	Boisly, R. J. ..	"
5052	"	Jepp, J. W. ..	"
5168	"	Gregory, H. ..	"
1190	"	Handasyde, S. ..	"
1276	"	Cooper, H. ..	"
1336	"	Dovey, C. ..	"
1360	"	Doyle, J. ..	"
1369	"	Earle, B. L. ..	"
1375	"	Shipton, H. ..	"
1448	"	Moore, W. ..	"
1591	"	Ince, J. ..	"
1603	"	Dolan, B. ..	"
1715	"	Rogers, H. G. ..	"
1751	"	Plaum, F. H. ..	"
1785	"	Phillips, W. J. ..	"
1799	"	Stowe, S. A. ..	"
1798	"	Gilbert, R. R. ..	"
1808	"	McClay, W. J. ..	"
1866	"	Sugden, W. ..	"
1894	"	Benjafield, H. J. ..	"
1946	"	Jane, E. ..	"
2009	"	Wilby, H. ..	"
2151	"	Church, A. W. ..	"
2210	"	Fletcher, W. ..	"
2226	"	Chatting, F. J. ..	"
2278	"	Gillbee, J. ..	"
4302	"	Steer, H. ..	"
4343	"	Parr, W. S. ..	"
4389	"	Dedows ..	"
4406	"	Sprinks, A. E. ..	"
4763	"	Watson, F. R. ..	"
4803	"	Coggin, W. ..	"
247	"	O'Callaghan, J. J. ..	"
19851	"	Claydon, P. E. ..	"
19665	"	Bexall, H. G. ..	"
1065	"	Dean, A. ..	"
2137	"	Crack, F. ..	"
2205	"	Lewis, A. R. ..	"
189	"	Taylor, G. A. ..	12.12.14
4696	"	Phillips, A. E. ..	"
19862	"	Tole, L. R. ..	"
	"	Eason, W. E. L. ..	"
5648	"	Smith, E. F. ..	"
4353	"	Burrell, B. G. ..	"
1598	"	Bryant, E. C. ..	"
2170	"	Tromans, W. B. ..	"
2264	"	Blake, W. T. B. ..	"
4894	"	Crossman, W. G. ..	"
5328	"	Maydon, F. ..	"
18433	Lce.-Serjt.	Goldfinch, H. C. ..	"
10524	Corporal	Malcolm, E. ..	"
17151	"	Brown, J. T. ..	"
11834	"	Hillier, G. W. ..	"
17108	"	Munro, H. ..	"
17735	"	Wilson, W. ..	"

As Dispensers.

As being in possession
of a First Class
Certificate of Edu-
cation and Army
Form C. 344.

To be Serjeants—Continued.

No.	Rank and Name	Date	Remarks
19010	Corporal Bull, B. J.	12.12.14	
19539	" Sayers, G. E.	"	
6089	" Vidler, E. C.	"	
19730	" Young, W. T.	"	
19838	" Tothill, R.	"	
19472	" Munson, C. E.	"	
17	" Berry, A. C.	"	
19626	" White, E. F.	"	
19133	" Dewhurst, J. C.	"	
19444	" Jones, H. A.	"	
6398	" Coad, R. H.	"	
1412	" Palmer, W. T.	"	
1643	" Mattock, F. H.	"	
1837	" Hopkins, C.	"	
1939	" Sawers, W.	"	
2189	" Munden, J. W. F.	"	
	" Cruikshank, J. H. L.	"	
	" Woodman, R.	"	
4384	" Turner, S. G.	"	As being in possession of a First Class Certi- ficate of Education.
4443	" White, E. H.	"	
4569	" Richardson, L.	"	
4682	" Taylor, A. E.	"	
4892	" Flint, B. W.	"	
4945	" Forman, J. E.	"	
4946	" Hastings, A.	"	
4949	" Tuson, L. I.	"	
2010	" Merriman, D.	"	
19672	" Healey, A. T. J.	"	
19982	" Steele, A. C. J.	"	
1940	" Turner, J. E.	"	
4307	" Hayes, H.	"	
19567	" Christie, J. T.	"	
2157	" Newell, C. W.	"	
4405	" Taylor, E. F.	"	
4991	" Shorten, B.	"	
5024	" Ballan, D. J.	"	
5134	" Vaughan, A.	"	
5161	" Theyers, A. H.	"	
5191	" Boswell, E. H.	"	
5565	" Day, W. R.	"	
5737	" Brown, H.	"	
5918	" Blair, H.	"	
	" Dermody, R. J.	"	
5935	" Purser, R. H.	"	
12076	" Ward, W. C. H.	20.1.15	
10220	" Azeal, T.	"	
11656	" Voisey, H. J. V.	"	
11236	" Embekin, B. A.	"	
15738	" Brough, H.	"	
11827	" White, W.	"	
17520	" Good, C.	"	
17725	" Ricketts, E.	"	
17925	" Sheerin, R.	"	
11153	" Woods, S.	"	
17421	" Plume, P.	"	
18015	" Dixon, W. H.	"	
19895	" Smith, W.	"	
18157	" Pruden, A.	"	

To be Serjeants—Continued.

No.	Rank and Name	Date	Remarks
12385	Corporal Rayner, E. A. ..	20.1.15	
16762	" Price, F. ..	"	
10464	" Morgan, A. ..	"	
18411	" Richards, G. H. ..	"	
18545	" Douglas, J. ..	"	
12751	" Carter, T. B. ..	"	
13004	" Leishman, R. ..	"	
18648	" Haley, J. B. ..	"	
14445	" Smith, W. E. ..	"	
18873	" Spiers, W. J. ..	"	
19368	" Hazell, J. ..	"	
18964	" Herbert, G. W. ..	"	
19001	" Barritt, J. ..	"	
19464	" Chamberlain, C. ..	"	
19110	" Smith, C. H. ..	"	
19135	" Quelch, W. H. ..	"	
19236	" Pettit, E. F. ..	"	
19119	" Bennett, W. E. ..	"	
18727	" Lewis, T. M. ..	"	
19175	" Stow, F. E. ..	"	
19249	" Caste, J. ..	"	
19419	" Clark, W. G. W. ..	"	
19427	" Vidler, O. F. ..	"	
19497	" Jackson, J. K. ..	"	
19621	" Kite, W. E. ..	"	
18425	" Atkinson, F. W. ..	"	
19746	" Dodwell, W. F. ..	"	
19710	" King, H. S. ..	"	
17818	" Horsnell, J. ..	"	
42	" Harding, D. G. ..	"	
87	" Woodley, A. W. ..	"	
94	" Price, D. W. ..	"	
118	" Rogers, A. C. ..	"	
186	" Fream, W. G. ..	"	
218	" Dale, L. A. ..	"	
264	" Trout, A. ..	"	
284	" Gregory, A. O. ..	"	
296	" Wilson, F. G. ..	"	
305	" Hobbes, J. W. ..	"	
19709	" Young, W. B. ..	"	
659	" Rousell, L. T. ..	"	
728	" Brooks, A. T. ..	"	
844	" Johnstone, B. D. ..	"	
968	" Fairweather, R. E. ..	"	
19409	" Hutchinson, A. ..	"	
1018	" Luker, H. ..	"	
1072	" French, H. A. ..	"	
1141	" Dyson, H. A. ..	"	
18743	" Worrad, H. ..	"	
18984	" Breeze, B. ..	"	
19085	" Vinton, C. J. ..	"	
1644	" Flavell, C. W. ..	"	
1539	" Catlin, F. G. ..	"	
1656	" Chivers, A. H. ..	"	
1688	" Drew, G. H. F. ..	"	
1710	" Hudson, J. R. ..	"	
1716	" Duncombe, F. G. H. ..	"	
1764	" Selden, H. W. ..	"	

As being in possession
of Army Form C,
344.

To be Serjeants—Continued.

No.	Rank and Name		Date	Remarks
1884	Corporal	Gaughan, E. S. ..	20.1.15	
1951	"	Money, F. J. R. ..	"	
1969	"	Overton, G. W. ..	"	
1975	"	Hawkes, W. ..	"	
1993	"	Passingham, E. G. ..	"	
2002	"	Craddock, G. ..	"	
1998	"	Patrick, E. ..	"	
2148	"	Ashcroft, J. ..	"	
2166	"	Mathias, W. T. ..	"	
2187	"	Thomas, H. ..	"	
2266	"	Mills, T. S. ..	"	
4330	"	Norman, H. R. ..	"	
4547	"	Lynn, G. A. ..	"	
4643	"	Lillywhite, P. ..	"	
4728	"	James, A. ..	"	
4935	"	Andrews, W. ..	"	
1472	"	Ribbons, E. D. ..	"	
19073	"	Leach, E. W. ..	"	
19429	"	Orton, R. ..	"	
19481	"	Mills, A. W. V. ..	"	
19939	"	Capon, F. M. ..	"	
795	"	Hunt, H. H. ..	"	
918	"	Nelson, W. ..	"	
1247	"	Buckland, F. E. ..	"	As being in possession of Army Form C. 344.
1478	"	Cheater, H. C. ..	"	
5452	"	Griffiths, H. ..	"	
2245	"	Cripps, A. G. ..	"	
5023	"	Grist, R. ..	"	
5157	"	Hobday, S. W. ..	"	As Dispenser.
5241	"	Hollier, F. C. ..	"	
5250	"	King, H. T. ..	"	As being in possession of Army Form C. 344.
5261	"	Jerred, A. ..	"	
2114	"	Stokes, H. S. ..	"	
17496	"	Browne, C. ..	"	As Dispenser.
1914	"	Dugmore, E. ..	"	As being in possession of Army Form C. 344.
2198	"	Duggan, J. H. W. ..	"	As Dispenser.
2257	"	Lever, T. J. ..	"	As being in possession of a First Class Certificate of Education.
6018	"	Pilgrim, A. J. ..	"	
6062	"	Kirk, A. E. ..	"	As Dispenser.
6392	"	Spurgeon, E. A. ..	"	
6626	"	Metcalf, J. ..	"	
6640	"	Underhill, T. G. ..	"	As being in possession of a First Class Certificate of Education.
6756	"	Wheatley, F. ..	"	
6932	"	Stewart, H. W. M. ..	"	
7055	"	Brendon, W. T. R. ..	"	
7355	"	Carter, E. F. ..	"	

To be Corporals.

19975	Private	Lee, R. J. ..	20.8.14	
19301	"	Richardson, H. ..	"	
1353	"	Ashwood, E. G. ..	"	
1401	"	Baxter, E. H. ..	"	
237	"	Flavell, J. E. ..	"	
1791	"	Elsey, P. G. ..	"	
97	"	Shave, A. A. ..	"	

To be Corporals—Continued.

No.	Rank and Name		Date	Remarks
189	Private	Taylor, G. A. ..	20.8.14	
	"	Page, F. C. ..	"	
4518	"	Quayle, J. J. ..	"	
4764	"	Pritchard, J. A. ..	"	
19454	"	Renshaw, E. S. ..	"	
10633	Lce.-Corpl.	Abbess, J. ..	12.10.14	
	"	Hanks, R. C. ..	"	
18864	"	Thorburn, J. ..	"	
19097	"	Koftoff, A. ..	"	
19783	"	Clayden, W. J. ..	"	
12096	"	Flynn, W. ..	"	
19993	"	Macaulay, W. ..	"	
2200	Private	Preece, A. ..	"	
9961	"	Rowlands, J. P. ..	"	
18950	"	Fielder, A. J. ..	"	
19241	"	Shipman, S. C. ..	"	
119	"	Murray, J. H. ..	"	
18658	"	Gardner, E. R. ..	"	
155	"	Carter, S. J. ..	"	
19456	"	Flanagan, W. J. ..	"	
19567	"	Christie, J. T. ..	"	
1099	"	Walton, A. ..	"	
1364	"	Glanville, W. E. ..	"	
1478	"	Cheater, H. C. ..	"	
1522	"	Luttrell, E. ..	"	
1490	"	Lansdowne, E. W. ..	"	
1603	"	Furniss, H. E. ..	"	
1670	"	Farley, A. E. ..	"	
5452	"	Griffiths, H. ..	"	
4696	"	Phillips, A. E. ..	"	
19862	"	Tole, L. R. ..	"	
1876	"	MacDonald, R. ..	"	
2124	"	Butt, W. ..	"	
2157	"	Newell, C. W. ..	"	
2245	"	Cripps, A. G. ..	"	
2297	"	Lawson, S. ..	"	
4319	"	Grimley, R. ..	"	
4368	"	Hardy, C. ..	"	
4405	"	Taylor, E. F. ..	"	
4437	"	Phillips, B. J. ..	"	
4666	"	Pearce, D. ..	"	
4836	"	Douglas, G. ..	"	
4866	"	Smyth, R. ..	"	
4694	"	Crossman, W. G. ..	"	
4991	"	Shorten, B. ..	"	
5023	"	Grist, R. ..	"	
5024	"	Ballan, D. J. ..	"	
5076	"	Phillips, F. H. ..	"	
5032	"	Kitley, H. A. R. ..	"	
5055	"	Gray, H. C. ..	"	
5086	"	Wickers, C. W. F. ..	"	
5110	"	Samme, J. E. ..	"	
5108	"	Westwood, C. ..	"	
5134	"	Vaughan, A. ..	"	
5157	"	Hobday, S. W. ..	"	
5161	"	Theyers, A. H. ..	"	
5154	"	Trotman, F. W. ..	"	
5171	"	Eason, W. E. L. ..	"	

To be Corporals—Continued.

No.	Rank and Name	Date	Remarks
6217	Private Schoenthal, C. ..	12.10.14	
5202	" Roughley, J. ..	"	
5225	" Young, W. T. ..	"	
5241	" Hollier, F. C. ..	"	
5242	" Phipps, H. E. ..	"	
5250	" King, H. T. ..	"	
5260	" Bew, A. J. ..	"	
5281	" Jerred, A. ..	"	
5310	" Lever, A. G. ..	"	
5341	" Conway, W. E. ..	"	
5348	" Evans, H. J. ..	"	
5370	" Lawrence, A. E. ..	"	
5368	" Bowden, R. J. ..	"	
5372	" O'Flaherty, J. ..	"	
5390	" Tait, D. C. ..	"	
5288	" Wilkie, W. ..	"	
5402	" Sexton, P. ..	"	
5411	" Griffiths, J. L. ..	"	
5413	" Wolsey, B. ..	"	
5441	" Durno, L. M. ..	"	
5430	" Dickson, S. ..	"	
5449	" Harris, C. W. ..	"	
5505	" Woolman, F. H. ..	"	
5507	" Page, F. R. ..	"	
5517	" Andrews, W. G. E. ..	"	
5562	" Caseley, A. C. J. ..	"	
5600	" Roberts, R. ..	"	
5614	" Reynolds, G. ..	"	
5122	" Godsell, H. J. ..	"	
5631	" Shaw, R. J. ..	"	
5648	" Smith, E. F. ..	"	
19431	" Pass, H. E. ..	"	
4641	" Gladman, G. F. ..	"	
4955	" Forrest, J. ..	"	
4973	" Tunncliffe, T. A. ..	"	
5025	" Parsons, E. ..	"	
5050	" Birtwistle, W. ..	"	
5084	" Bawden, S. B. ..	"	
5191	" Boswell, E. H. ..	"	
5192	" Turner, F. ..	"	
5230	" Wright, C. ..	"	
5328	" Haydon, F. ..	"	
5543	" Docherty, J. ..	"	
5544	" Keep, F. ..	"	
5565	" Day, W. R. ..	"	
5611	" Swatton, E. A. ..	"	
5646	" Holdup, P. L. ..	"	
5772	" Loft, A. C. ..	"	
5669	" Clark, H. ..	"	
5679	" Couzens, W. H. S. ..	"	
5691	" Gallagher, H. ..	"	
5737	" Brown, H. ..	"	
5745	" Jones, D. ..	"	
5747	" Cotter, D. C. ..	"	
5773	" Anthony, W. ..	"	
5763	" Littlemore, S. H. ..	"	
5796	" Dixon, W. V. ..	"	
5817	" Slattery, W. ..	"	

To be Corporals—Continued.

No.	Rank and Name		Date	Remarks
5856	Private	Chapman, H. . .	12.10.14	With seniority next below No. 19993 Corpl. W. Macaulay.
5877	"	Hilton, R. . .	"	
5906	"	Fagg, C. G. . .	"	
5901	"	Johnson, J. E. . .	"	
5910	"	McLeod, D. . .	"	
5911	"	Howard, H. J. . .	"	
5918	"	Blair, H. . .	"	
5926	"	Dermody, R. J. . .	"	
5936	"	Hughes, W. . .	"	
5985	"	Purser, R. H. . .	"	
5964	"	Hewitt, J. A. . .	"	
2672	"	Jay, E. A. . .	"	
20029	"	Sellwood, W. J. . .	"	
20218	"	Clarke, A. I. . .	"	
20003	"	Death, H. J. . .	"	
20777	"	Moore, W. H. . .	"	
20758	"	Iveson, W. J. . .	"	
20767	"	Hayward, E. C. . .	"	
20792	"	Beesley, J. . .	"	
20374	"	Bennell, W. . .	"	
20789	"	Harrison, A. C. . .	"	
17092	"	Emmott, F. . .	"	
17511	Lce.-Cpl.	Carter, D. . .	12.12.14	
17888	"	Scott, M. . .	"	
19109	"	Pout, H. W. . .	"	
2114	"	Stokes, H. S. . .	"	
19898	"	Ames, C. M. . .	"	
365	"	Warner, W. O. . .	"	
17496	Private	Browne, C. . .	"	
17869	"	Pulling, W. . .	"	
19346	"	Hopper, B. . .	"	
19761	"	Whitworth, L. . .	"	
	"	Phillips, H. . .	"	
272	"	Pout, R. M. . .	"	
934	"	Giles, T. . .	"	
1096	"	Cooney, J. A. . .	"	
1833	"	Taylor, J. C. T. . .	"	
1914	"	Dugmore, E. . .	"	
2198	"	Duggan, J. H. W. . .	"	
2257	"	Lever, T. J. . .	"	
4646	"	Taylor, H. . .	"	
5566	"	Douce, T. . .	"	
5664	"	Rogers, J. . .	"	
	"	Burns, J. . .	"	
6018	"	Pilgrim, A. J. . .	"	
6360	"	Pegg, R. W. G. . .	"	
6062	"	Kirk, A. E. . .	"	
6071	"	Rawlings, G. H. . .	"	
6108	"	Allen, W. G. . .	"	
6186	"	Plunkett, A. E. . .	"	
6225	"	Williams, R. . .	"	
6235	"	Green, G. L. . .	"	
6247	"	Humphreys, C. W. . .	"	
6291	"	Gunter, J. E. . .	"	
6321	"	Stewart, A. E. . .	"	
6356	"	Stevens, F. D. . .	"	
6386	"	Price, W. G. . .	"	
6392	"	Spurgeon, E. A. . .	"	

To be Corporals—Continued.

No.	Rank and Name	Date	Remarks
6451	Private	Cocks, G. A.	12.12.14
6480	"	Child, H. G.	"
6496	"	Robertson, J.	"
6515	"	Querney, D.	"
6626	"	Metcalf, J.	"
6640	"	Underhill, T. G.	"
6671	"	Plumridge, J. H.	"
6679	"	Lomas, R. W.	"
6756	"	Wheatley, F.	"
6819	"	Walsh, J.	"
6932	"	Stewart, H. W. H.	"
7049	"	Clack, H. C.	"
7055	"	Brendon, W. T. R.	"
7345	"	Collins, W. J.	"
7355	"	Carter, E. F.	"
10599	"	Jupp, H. G.	"
12953	"	Jonas, J.	"
11874	"	Faun, H.	"
11865	"	Freshwater, N.	"
434	"	Kendrick, J.	"
7471	"	Sworn, A. V.	"
1256	"	Goodfellow, A.	Spec. Reserve.
1930	"	Burr, T. E.	"
1440	"	Johnstone, G.	"
1548	"	Paskell, R. J.	"
1562	"	Mogford, B.	"
1578	"	Savage, E.	With seniority next below No. 1096 Corpl. J. A Oooney.
1931	"	Lyons, O. A.	"
3084	"	Beck, H. F.	With seniority next below No. 1914 Corpl. E. Dugmore.
4314	"	Finlayson, G... ..	With seniority next below No. 2257 Corpl. T. J. Lever.
4962	"	Matheson, J.	"
5232	"	Drury, S. T.	With seniority next below No. 4646 Corpl. H. Taylor.
5806	"	Stevens, E. S.	With seniority next below No. 5664 Corpl. J. Rogers.
6153	"	Tucker, O. P.	With seniority next below No. 6103 Corpl. W. G. Allen.
6314	"	Liddle, J.	With seniority next below No. 6291 Corpl. J. E. Gunter.
7065	"	Truscott, G. P.	With seniority next below No. 7049 Corpl. H. C. Clark.
18722	"	Leach, W. J. J.	20.1.15
669	"	Marlborough, T. A.	} In accordance with Corps Order No. 1 of this date.
7191	"	Mears, R.	
9939	"	Burns, A.	
19894	Lce.-Corpl.	Cook, C. A.	
4700	Private	Gardner, F.	"

To be Corporals—Continued.

No.	Rank and Name	Date	Remarks
4907	Private	Freemantle, A. J. ..	20.1.15
4961	"	Day, A. ..	"
5560	"	Porter, G. A. ..	"
6594	"	Simons, A. ..	"
7112	"	Holtsbaum, F. ..	"
9000	"	Smea, C. E. ..	"
10817	"	Cuthew, G. ..	"
10728	"	Browne, R. ..	"
10934	"	Brewer, F. ..	"
11302	"	Postell, J. ..	"
11378	"	Rogers, P. ..	"
11678	"	Stewart, J. W. ..	"
18074	"	Partridge, W. F. ..	"
11801	"	Sturges, J. ..	"
12283	"	Carter, W. ..	"
12555	"	Rogers, T. ..	"
12718	"	Barton, J. ..	"
2242	"	Thomson, J. ..	"
13400	"	Short, G. ..	"
14761	"	Stanley, W. C. ..	"
15383	"	Sawers, W. ..	"
16232	"	Knox, W. ..	"
16274	"	Elgie, F. W. ..	"
17179	"	McEnnery, T. ..	"
17169	"	Andrews, W. ..	"
17743	"	Dress, F. ..	"
17900	"	Loasby, E. J. ..	"
17972	"	Burgess, G. ..	"
18003	"	Batcock, F. ..	"
19505	"	Baugh, E. H. ..	"
18098	"	Ellis, T. G. ..	"
18172	"	Cooper, J. H. ..	"
18196	"	White, J. J. ..	"
18285	"	Chambers, J. ..	"
18478	"	Burton, A. ..	"
18484	"	Scott, G. C. G. ..	"
18510	"	Banyard, E. W. ..	"
18570	"	Hart, J. ..	"
18610	"	Hassard, H. W. ..	"
18753	"	Elvin, A. R. ..	"
18758	"	Woodward, T. ..	"
18920	"	Jones, E. N. ..	"
18923	"	James, A. ..	"
18935	"	Keech, J. R. ..	"
19065	"	Roberts, E. G. ..	"
19078	"	Deavin, A. M. ..	"
19098	"	Burley, F. P. ..	"
19199	"	Deane, W. D. ..	"
19316	"	Misselbrook, C. A. ..	"
19343	"	Bradley, S. E. ..	"
19353	"	Chapple, J. ..	"
2201	"	Ring, R. ..	"
19546	"	Joys, A. S. ..	"
19551	"	Tims, A. ..	"
19605	"	Nairn, M. ..	"
19634	"	Kelliher, J. E. ..	"
1266	"	Whiterod, J. ..	"
19848	"	Harwood, W. J. ..	"

To be Corporals—Continued.

No.	Rank and Name	Date	Remarks
19873	Private Kent, W. A. L. ..	20.1.15	
19880	" Parkings, A. L. ..	"	
19937	" Platford, G. T. ..	"	
20	" Lewis, H. S. ..	"	
63	" Owen, H. ..	"	
162	" Thatcher, H. E. H. ..	"	
255	" Tophill, F. ..	"	
695	" Sweet, W. ..	"	
865	" Flynn, J. ..	"	
881	" David, H. ..	"	
944	" Westlake, H. J. ..	"	
988	" Pretty, G. ..	"	
1098	" Wright, G. M. ..	"	
1126	" Crowe, W. M... ..	"	
1268	" Gray, J. ..	"	
1368	" Bunker, A. ..	"	
1407	" Staples, G. ..	"	
1493	" Parsons, W. J. ..	"	
1601	" Belcher, J. ..	"	
1600	" Godden, F. T. H. ..	"	
1759	" Meenagh, J. H. ..	"	
1769	" Watt, J. ..	"	
1996	" Bulmore, L. E. ..	"	
2009	" Latimer, H. ..	"	
2043	" Barleycorn, F. J. F. ..	"	
2117	" Ives, L. H. ..	"	
2142	" Taylor, E. C. ..	"	
6491	" Jones, L. ..	"	
2167	" Stirk, A. J. ..	"	
2262	" Abercromby, R. H. ..	"	
2275	" Ross, W. C. ..	"	
4413	" Clinton, T. ..	"	
4596	" Richards, G. R. ..	"	
4794	" Pither, A. G. ..	"	
4890	" Tumilty, J. ..	"	
4952	" Ingham, R. ..	"	
4998	" Daltrey, H. ..	"	
5018	" Cook, W. C. ..	"	
5089	" Brisbane, W. ..	"	
5102	" Randle, J. O... ..	"	
5124	" Couchman, H. F. ..	"	
5128	" Dean, P. ..	"	
5135	" Caudell, C. H. J. ..	"	
5150	" Jacomb, C. E. ..	"	
5235	" Botten, G. H. ..	"	
5376	" Esworthy, L. St. J. ..	"	
5259	" High, W. ..	"	
5267	" Roberts, J. F. E. ..	"	
5290	" Hadfield, E. ..	"	
5327	" White, L. ..	"	
5335	" Osborne, F. R. ..	"	
5450	" Tapp, W. J. ..	"	
5575	" Rogers, A. ..	"	
5635	" Angus, G. S. ..	"	
5656	" Ware, J. ..	"	
5686	" Brookes, F. C. ..	"	
5697	" Bowen, W. ..	"	
5727	" Field, R. ..	"	

To be Corporals—Continued.

No.	Rank and Name		Date	Remarks
5728	Private	Biltcliffe, T.	20.1.15	
5739	"	Bird, H. P.	"	
5740	"	Jones, J. T. G.	"	
5821	"	Boffin, C. J.	"	
5852	"	Stone, T. G.	"	
5873	"	Sloper, F. A.	"	
5880	"	Vallance, W. C.	"	
5946	"	Clarkson, J.	"	
5949	"	Inwood, C. G.	"	
5960	"	Stephens, J. W.	"	
5971	"	Kennedy, P.	"	
2485	"	Bazeley, G. W.	"	
2746	"	Spender, J. D.	"	
2785	"	Hughes, A.	"	
2991	"	Kean, R.	"	

These promotions are subject to the conditions laid down in Paragraph 85 Standing Orders for the Royal Army Medical Corps.

APPOINTMENTS.

The following appointments to complete Establishment will take effect from the dates specified :—

To be Lance-Serjeants.

No.	Rank and Name		Date	Remarks
10626	Corporal	Hubbert, H.	12.10.14	
12459	"	Poulton, F. G.	"	
18483	"	Goldfinch, H. C.	"	
18934	"	Court, D. D.	"	
16022	"	Dawson, J. J... ..	"	
11755	"	Paulizky, J.	"	
17910	"	Green, W.	"	
12362	"	Porter, T.	"	
18530	"	Murphy, A.	"	
10462	"	Bushman, A. A.	"	
19126	"	Perkins, F. H.	"	
19385	"	Johnson, H.	"	
19604	"	Pollock, R.	"	
19812	"	Barron, F. P... ..	"	
2108	"	Rogers, T. W. G.	"	
19039	"	Emerson, J. T.	"	
19583	"	Pickerden, T.	"	

These promotions and appointments are subject to the conditions laid down in paragraph 24 Standing Orders for the Royal Army Medical Corps.

Reposting to Corps.

The undermentioned Non-commissioned Officers rejoined the Corps on the dates specified :—

No.	Rank and Name		Date	Remarks
11370	Staff-Serjt.	Loveland, F.	19.8.14	From Territorial Force.
12535	Serjeant	Oliver, T.	2.9.14	„ Colonial Govt.
17541	„	McConn, P.	7.9.14	„ „
12533	„	Ward, H. C.	27.9.14	„ Territorial Force.
12522	Qmr.-Serjt.	Gallie, S.	8.1.15	„ Egyptian Army.
10751	Staff-Serjt.	Leeves, G. C.	14.1.15	„ Territorial Force.
17759	„	Black, J.	5.12.14	„ Colonial Govt.
10203	Serjeant	Webberley, E. J. ..	22.1.15	„ Territorial Force.

Buglers.

The following Boys are appointed Buglers from September 22, 1914, inclusive :—

7878	Brindle, F.	9928	Fogerty, L. A. J.	10080	Welch, J.
9922	Woodhead, J.	9932	Elmer, S. F.	10084	Arnold, C.

The undermentioned Boys are appointed Buglers from October 31, 1914, inclusive.

No. 9931 Gregg, D. | No. 10195 Hyson, R. P.

NOTES FROM SIMLA.—Lieutenant-Colonel E. Eckersley, R.A.M.C., Assistant Director of Medical Services (British Service), writes as follows, dated Simla, February 17, 1915 :—

“ *Appointments.*—Lieutenant A. G. MacIlwaine, has been appointed Assistant Embarkation Medical Officer, Bombay.

“ The following officers have been appointed to command the Station Hospitals noted against their names :—

“ Major N. H. Ross, Station Hospital, Allahabad.

“ Major H. E. Staddon, Station Hospital, Sialkot, temporary.

“ Lieutenant-Colonel W. G. Beyts, Station Hospital, Lucknow, temporary.

“ Major F. A. H. Clarke, Station Hospital, Agra, temporary.

“ Lieutenant-Colonel F. W. Begbie, Station Hospital, Poona, temporary.

“ *Reversions to Home Establishment.*—Major G. E. F. Stammers has reverted to the Home Establishment.

“ *Seconding.*—Captain C. M. Rigby, has been seconded from February 5, 1915, on appointment as Staff-Surgeon to His Excellency the Governor of Bombay.

“ *Specialists.*—The following officers have been appointed specialists in the subjects noted against their names :—

“ Captain J. R. Yourell, Prevention of Disease, Burma Division, temporary.

“ Captain W. J. Dunn, Electrical Science, Burma Division, temporary.

“ Captain G. Potts, Otology, Rhinology and Laryngology, 8th Division.

“ Captain A. S. M. Winder, Prevention of Disease, 8th Division.

“ Lieutenant G. A. Blake, Dermatology, 8th Division, temporary.

“ Lieutenant O. W. J. Wynne, Advanced Operative Surgery, 6th Divisional area.

“ *Transfers*—The following transfers have been ordered :—

“ Captain W. A. Frost from the 5th to the 4th Division.

“ Lieutenant A. G. MacIlwaine, from the 4th to the 6th Divisional area.

“ Lieutenant O. W. J. Wynne, from the 8th to the 6th Divisional area.

“ Lieutenant-Colonel W. G. Beyts from the 7th to the 8th Division, temporary.

“ Lieutenant-Colonel F. W. Begbie from the Burma to the 6th Divisional area, temporary.

“ Major F. A. H. Clarke, from the 8th to the 7th Divisional Area, temporary.”

Colonel E. Eckersley, Assistant-Director of Medical Services (British Service), writes as follows, dated Simla, March 18, 1915 :—

“ *Appointments.*—Colonel A. E. Tate, V.H.S., is transferred to Quetta as Assistant-Director of Medical Services, 4th (Quetta) Division.

"Colonel S. C. Philson is appointed Assistant-Director of Medical Services Presidency Brigade.

"Colonel E. Eckersley is appointed Assistant-Director of Medical Services, 1st (Peshawar) Division.

"Colonel E. A. Burnside is appointed Assistant-Director of Medical Services, Bangalore and Southern Brigades.

"Colonel B. J. Inniss is appointed Assistant-Director of Medical Services, Abbottabad and Sialkot Brigades.

"Colonel W. Hallaran is appointed Assistant-Director of Medical Services, Jubbulpore and Jhansi Brigades.

"Colonel W. T. Mould is appointed Assistant-Director of Medical Services, Allahabad and Fyzabad Brigades.

"The following officers have been appointed to command the Station Hospitals noted against their names:—

"Lieutenant-Colonel W. E. Hardy, Station Hospital, Quetta.

"Major E. H. Condon, Station Hospital, Rawalpindi.

"Major F. M. Mangin, Station Hospital, Meerut.

"Major C. T. Samman, Station Hospital, Bangalore.

"Major E. S. Clark, Station Hospital, Ambala.

"Major J. McD. McCarthy, Station Hospital, Nowshera.

"Major A. R. O'Flaherty, Fyzabad.

"Major H. B. G. Walton, Bareilly.

"Leave.—Captain W. B. Rennie has been granted leave *ex-India* on medical certificate from February 11, 1915.

"Specialists.—The following officers have been appointed specialists in the subjects noted against their names:—

"Major C. S. Smith, Advanced Operative Surgery, 8th (Lucknow) Division.

"Major W. Croly, Otology, Laryngology and Rhinology, 5th (Mhow) Division (temporary).

"Captain S. S. Dykes, Prevention of Disease, 8th (Lucknow) Division (temporary).

"Lieutenant W. W. Pratt, Prevention of Disease, 5th (Mhow) Division.

"Transfers.—The following transfers have been ordered:—

"Lieutenant-Colonel W. E. Hardy from the 8th (Lucknow) to the 4th (Quetta) Division.

"Major E. H. Condon from the 7th (Meerut) Divisional Area to the 2nd (Rawalpindi) Division.

"Major F. M. Mangin from the 6th (Poona) Divisional Area to the 7th (Meerut) Divisional Area.

"Major C. T. Samman from the 5th (Mhow) to the 9th (Secunderabad) Division.

"Major E. S. Clark from the 7th (Meerut) Divisional Area to the 3rd (Lahore) Divisional Area.

"Major J. McD. McCarthy from the 3rd (Lahore) Divisional Area to the 1st (Peshawar) Division.

"Major A. R. O'Flaherty from the 3rd (Lahore) Divisional Area to the 8th (Lucknow) Division."

SPECIAL RESERVE.

ROYAL ARMY MEDICAL CORPS.

Major James B. Simpson, M.D., from attached to units other than medical units, to be Major, dated February 20, 1915.

Transport Officer and Honorary Major Benjamin Hardcastle, from 5th London Field Ambulance, to be Transport Officer, with the honorary rank of Major, dated March 19, 1915.

Captain Morton W. Ruthven, M.B., from the half-pay list, is restored to the establishment, dated March 12, 1915.

Lieutenant William S. S. Douglas to be Captain (temporary), dated March 4, 1915.

Lieutenant Harry V. Chapman to be Captain, dated March 6, 1915.

James Thomson Cameron to be Lieutenant (on probation).

Donald Christopher Macdonald, M.B., to be Lieutenant (on probation), dated January 29, 1915.

The undermentioned Lieutenants are confirmed in their rank:—

William Leonard Eliot Reynolds; Frank Cecil Harrison; Sydney W. Lund

William K. Campbell; Owen G. Parry-Jones; Eric S. Mawe; Edward W. Mann.

Second Lieutenant Robert H. Cunningham to be Lieutenant, dated March 6, 1915.

TERRITORIAL FORCE.**ROYAL ARMY MEDICAL CORPS.**

The undermentioned as Lieutenant-Colonels :—

Dated December 2, 1914.—John Edward Henry Davies.

Dated December 13, 1914.—Temporary Captain Percy Sargent, M.B., F.R.C.S., is granted temporarily the honorary rank of Lieutenant-Colonel.

Dated January 6, 1915.—Captain Thomas Price Thomas, Territorial Force.

Dated January 9, 1915.—Major Robert John Richard Cobden Simons, Territorial Force.

Dated March 1, 1915.—Edward Augustine Hanly, M.D., to be temporary Lieutenant-Colonel.

The appointment of Lieutenant-Colonel Henry G. Falkner as Assistant Director of Medical Services, with the temporary rank of Colonel, bears date February 3, 1915, and not as stated in the *London Gazette* of March 6, 1915.

The undermentioned as Majors :—

Dated November 20, 1914.—Captain Dennis Embleton, 3rd London General Hospital, Territorial Force, to be temporary Major.

Dated December 2, 1914.—William Bickerton Edwards.

Dated December 13, 1914.—Temporary Captain Gordon M. Holmes, M.D., is granted temporarily the honorary rank of Major.

Dated March 8, 1915.—James Arthur Devine, M.D., D.S.O., to be temporary Major.

Dated March 9, 1915.—William Thomas Prout, M.B., C.M.G., to be temporary Major.

The undermentioned to be temporary Captains :—

Dated December 2, 1914.—Andrew Woodroffe Anderson.

Dated January 30, 1915.—Edward Llewelyn Parry-Edwards.

Dated February 15, 1915.—William Whiteman Carlton Topley, M.B.

Dated February 22, 1915.—Edward Lake Gowlland, M.B., late Major, Royal Garrison Artillery, Territorial Force.

Dated February 23, 1915.—Norman Howard Mummery, late Staff Surgeon, R.N.

Dated March 1, 1915.—Lieutenant Thomas H. W. Idris relinquishes his temporary commission ; Charles Edward Walker.

Dated March 10, 1915.—Robert Fielding-Ould, M.D.

Dated March 16, 1915.—Temporary Lieutenant Robert J. D'A. Irvine, M.B., to be temporary Captain.

Dated March 19, 1915.—Temporary Lieutenant Arthur H. Bindloss, M.B., late Lieutenant-Colonel, 9th Battalion Middlesex Regiment, Territorial Force ; temporary Lieutenant Henry R. S. Van Ryck de Groot.

Dated March 20, 1915.—Temporary Lieutenant Isaac Jones, M.D., to be temporary Captain.

Dated March 23, 1915.—Temporary Lieutenant Fergus Armstrong to be temporary Captain.

Dated March 25, 1915.—Charles S. Cato, late Captain, R.A.M.C. ; Walter P. Yetts.

TERRITORIAL FORCE.

2nd East Lancashire Field Ambulance.—Lieutenant Frederick Jeeves to be Captain (temporary), dated February 5, 1915.

3rd East Lancashire Field Ambulance.—Lieutenant Charles Bertram Marshall, M.B., to be Captain (temporary), dated February 27, 1915.

Yorkshire Mounted Brigade Field Ambulance.—Surgeon-Captain Robert A. Draper, from East Riding of Yorkshire Yeomanry, to be Major (temporary), dated March 14, 1915.

2nd West Riding Field Ambulance.—Major Harold Collinson, M.B., F.R.C.S., to be Lieutenant-Colonel (temporary), dated December 25, 1914.

3rd West Riding Field Ambulance.—Staff-Serjeant Henry Fuller to be Transport Officer, with the honorary rank of Lieutenant, dated April 3, 1915.

The announcement of the appointment of Charles William Smith, M.B., as Lieutenant, which appeared in the *London Gazette* of November 30, 1914, is cancelled.

West Riding Casualty Clearing Station.—Major Ernest Solly, M.B., F.R.C.S., from attached to units other than medical units, to be Major (temporary), dated February 23, 1915.

West Riding Divisional Train.—Lieutenant Henry G. Ludolf is seconded, dated March 27, 1915.

1st West Lancashire Field Ambulance.—Surgeon-Captain James Wood, from 5th Battalion the Loyal North Lancashire Regiment, to be Captain, dated December 2, 1914.

2nd West Lancashire Field Ambulance.—The announcement of the seconding of Captain Owen H. Williams, M.B., which appeared in the *London Gazette* of January 4, 1915, is cancelled; Captain Owen H. Williams, M.B., to be Major (temporary), dated January 15, 1915.

South Midland Casualty Clearing Station.—Alexander Watkin Nuthall, F.R.C.S. (late Captain, 5th Battalion Royal Warwickshire Regiment), to be Captain, dated January 11, 1915.

2nd South Midland Mounted Brigade Field Ambulance.—John Cecil Stoyte Dunn to be Lieutenant, dated February 27, 1915; Alexander Rodger, M.B., to be Lieutenant, dated March 14, 1915; Captain Henry G. Magrath to be Major (temporary), dated March 26, 1915.

3rd South Midland Field Ambulance.—Private Samuel Woods Hill, from Herts Yeomanry, to be Quartermaster with the honorary rank of Lieutenant, dated March 14, 1915.

1st Southern General Hospital.—The announcement of the appointment as Lieutenants of Stephen G. Askey, M.B., Percival C. Cole and Ambrose W. Owen, M.D., which appeared in the *London Gazette* of December 18, 1914, is cancelled.

3rd Southern General Hospital.—Captain Robert L. Gamlen resigns his commission on account of ill-health, dated March 27, 1915.

2nd South Western Mounted Brigade Field Ambulance.—Thomas Shaw to be Transport Officer, with the honorary rank of Lieutenant, dated January 13, 1915.

1st North Midland Field Ambulance.—Major Henry G. W. Dawson, M.B., to be Lieutenant-Colonel (temporary), dated March 10, 1915; Frank Pearce Sturm, M.B., to be Lieutenant, dated March 15, 1915.

3rd North Midland Field Ambulance.—Lieutenant-Colonel Lewis Walter Pockett, M.D., retired list, Territorial Force, to be Lieutenant-Colonel (temporary), dated February 22, 1915.

2nd Northumbrian Field Ambulance.—Clifford Crawshaw Pickles (late Lieutenant, 5th Battalion, Alexandra, Princess of Wales's Own (Yorkshire Regiment), to be Captain (temporary), dated April 3, 1915.

Northumbrian Casualty Clearing Station.—Charles Frederick Morris Saint, M.D., F.R.C.S., to be Lieutenant, dated November 14, 1914.

1st Northern General Hospital.—Major Frederick C. Pybus, M.B., F.R.C.S., to be seconded, dated March 12, 1915.

4th Northern General Hospital.—Henry Joste Smith, M.B., to be Lieutenant, dated February 15, 1915.

Scottish Horse Mounted Brigade Field Ambulance.—Frederick George Harper, M.D. (late Lieutenant, Royal Army Medical Corps, Territorial Force), to be Lieutenant, dated March 1, 1915.

Highland Mounted Brigade Field Ambulance.—Staff-Serjeant Hector McIver to be Transport Officer, with the honorary rank of Lieutenant, dated March 18, 1915.

Lowland Mounted Brigade Field Ambulance.—Staff-Serjeant William Walker to be Transport Officer, with the honorary rank of Lieutenant, dated March 14, 1915.

1st Lowland Field Ambulance.—Captain William C. Murray, M.B., to be Major (temporary), dated December 20, 1914.

2nd Lowland Field Ambulance.—Major William Bryce, M.D., from 1st Lowland Field Ambulance, to be Major, dated December 10, 1914; Staff-Serjeant George Donaldson to be Transport Officer, with the honorary rank of Lieutenant, dated March 14, 1915.

3rd Lowland Field Ambulance.—Captain James W. Keay, M.D., to be Major (temporary), dated March 3, 1915.

South Wales Mounted Brigade Field Ambulance.—Major James MacK. Harrison, M.B., to be Lieutenant-Colonel, dated March 27, 1915; Lieutenant Josiah Browne to be Captain (temporary), dated March 27, 1915.

Welsh Border Mounted Brigade Field Ambulance.—William Williamson Yeats to be Transport Officer, with the honorary rank of Lieutenant, dated February 13, 1915; Frank Leslie Newton, M.B., to be Lieutenant, dated March 3, 1915.

2nd Wessex Field Ambulance.—Lieutenant Henry W. Spaight resigns his commission on account of ill-health, dated April 3, 1915.

1st Eastern General Hospital.—Paul Norman Blake Odgers, M.B., F.R.C.S., to be Captain, whose services will be available on mobilization, dated March 21, 1915.

2nd Eastern General Hospital.—Cyril Casson Messiter to be Lieutenant, dated March 3, 1915.

South-Eastern Mounted Brigade Field Ambulance.—Major (Honorary Lieutenant in the Army) Lewis Harcourt Coles, Reserve of Officers, retired list, Territorial Force, to be Transport Officer, with the honorary rank of Captain, dated March 18, 1915.

1st East Anglian Field Ambulance.—Transport Officer and Honorary Lieutenant Frederick Harris resigns his commission, dated March 1, 1915.

2nd East Anglian Field Ambulance.—Captain Alister C. Young is seconded, dated March 15, 1915. Lieutenant James Arthur, M.D., from attached to Units other than Medical Units, to be Lieutenant, dated March 28, 1915.

3rd East Anglian Field Ambulance.—Captain John R. Pooler, M.B., to be Major (temporary), dated February 24, 1915.

1st Home Counties Field Ambulance.—Francis Seymour Jackson to be Lieutenant, dated March 16, 1915; Lieutenant Charles Killick, M.D., F.R.C.S., to be Captain (temporary), dated March 30, 1915.

2nd Home Counties Field Ambulance.—Captain Antony A. Martin, M.D., to be Major (temporary), dated March 30, 1915.

3rd Home Counties Field Ambulance.—William Cummings, M.B., to be Lieutenant dated March 5, 1915; Frank Alford Armstrong to be Quartermaster, with the honorary rank of Lieutenant, dated March 14, 1915.

1st London (City of London) Field Ambulance.—Quartermaster and Honorary Lieutenant Cuthbert H. Withers, from the 1st London Casualty Clearing Station, to be Transport Officer, with the honorary rank of Lieutenant, dated March 19, 1915.

1st London Casualty Clearing Station.—Quartermaster-Serjeant Dudley Thomas Dixon, from the 1st London (City of London) General Hospital, to be Quartermaster, with the honorary rank of Lieutenant, dated March 18, 1915; Alexander Urquhart, M.D., to be Lieutenant, dated March 25, 1915.

2nd London (City of London) Field Ambulance.—Major William V. Sinclair to be Lieutenant-Colonel (temporary), dated November 4, 1914; Lieutenant Horace G. L. Haynes to be Captain, dated December 18, 1914; Serjeant Edward Samuel Jones, from 1st London (City of London) Field Ambulance, to be Transport Officer, with the honorary rank of Lieutenant, dated March 19, 1915.

3rd London (City of London) Field Ambulance.—Major George L. L. Lawson to be Lieutenant-Colonel (temporary), dated February 9, 1915; Staff-Serjeant William Arthur Chapman to be Transport Officer, with the honorary rank of Lieutenant, dated March 14, 1915; Charles Eustace Williams to be Lieutenant, dated March 19, 1915; Alfred Norman George Jeans to be Lieutenant, dated March 27, 1915.

3rd London General Hospital.—Captain Sidney M. Smith, M.B., is seconded, dated March 25, 1915.

4th London Field Ambulance.—Quartermaster Serjeant Charles Leonard Baynes, from the 9th (County of London) Battalion, The London Regiment, to be Quartermaster, with the honorary rank of Lieutenant, dated March 25, 1915; Transport Officer and Honorary Captain Alfred J. Messent resigns his commission, dated March 26, 1915.

6th London Field Ambulance.—William Henry Dickinson to be Lieutenant, dated January 26, 1915.

Transport.—Transport Officer and Honorary Lieutenant John L. Hamilton, from 3rd Home Counties Field Ambulance, to be Transport Officer, with the honorary rank of Lieutenant, dated April 3, 1915.

Sanitary Service.—Captain Herbert E. Corbin to be Major, dated February 17, 1915.

David Thomas Rocyn Jones, M.B., to be Captain, whose services will be available on mobilization, dated March 17, 1915.

ATTACHED TO UNITS OTHER THAN MEDICAL UNITS.

The date of appointment of George A. Brogden, M.D., as Lieutenant is August 5, 1914, and not as stated in the *London Gazette* of August 21, 1914.

The announcement of the appointment of Frank Winter Lawson as Lieutenant, which appeared in the *London Gazette* of October 6, 1914, is cancelled.

Captain Ernest Solly, M.B., F.R.C.S., to be Major, dated November 20, 1914.

The date of appointment of Lieutenant Frank G. Prestwich is November 24, 1914, and not as stated in the *London Gazette* of January 2, 1915.

Lieutenant Alfred J. Gibson, M.B., to be Captain, dated January 25, 1915.
 The announcement of the seconding of Lieutenant George F. R. Smith, M.B., which appeared in the *London Gazette* of February 1, 1915, is cancelled.
 Captain John Orton, M.D., from the Territorial Force Reserve, to be Captain, dated February 4, 1915.
 Captain (Honorary Lieutenant in Army) Michael J. Mahoney, M.D., to be Major, dated February 6, 1915.
 Hugh Boyd Cunningham, M.B., to be Lieutenant, dated February 12, 1915.
 Charles Ranald Handfield-Jones, M.D. (late Surgeon-Captain, 24th Middlesex Volunteer Rifle Corps), to be Captain, dated February 23, 1915.
 Donald Peter Maclaren Farquharson, M.B. (late Lieutenant 5th Volunteer Battalion, Argyll and Sutherland Highlanders), to be Captain (temporary), dated February 23, 1915.
 Sidney Robert Walker (late Captain Uganda Rifles) to be Lieutenant, dated February 23, 1915.
 Captain Peter M. Dewar to be Major, dated February 25, 1915.
 Berkeley Noel Ash to be Lieutenant, dated February 26, 1915.
 John Russell Brodie Russell, M.B., to be Lieutenant, dated February 28, 1915.
 Thomas Willoughby Cole, M.B., to be Lieutenant, dated February 28, 1915.
 Lorton Alexander Wilson to be Lieutenant, dated March 1, 1915.
 Frank Jeffree, M.D., to be Lieutenant, dated March 3, 1915.
 Ismay Donald Stubbs to be Lieutenant, dated March 6, 1915.
 Lieutenant Alfred H. Bell, from 5th London Field Ambulance to be Lieutenant, dated March 7, 1915.
 Lieutenant Duncan F. Macrae, M.B., from London Mounted Brigade Field Ambulance, to be Lieutenant, dated March 21, 1915.
 Lieutenant Lionel G. Pearson, M.B., from the 4th London Field Ambulance, to be Lieutenant, dated March 25, 1915.
 Captain John Hobbs, F.R.C.S., is seconded, dated March 28, 1915.
 John Alban Davies (late Captain, 7th (Merioneth and Montgomery) Battalion, The Royal Welsh Fusiliers) to be Captain, dated March 28, 1915.
 Gerald Wetherell Capron Hollist (late Surgeon, Royal Navy) to be Lieutenant, dated March 30, 1915.
 Captain Charles J. L. Krumbholz resigns his commission on account of ill-health, dated April 2, 1915.

ROYAL ARMY MEDICAL CORPS FUND.

THE Annual General Meeting will be held on Monday, June 14, 1915, at 2.30 p.m., in the Library at the Royal Army Medical College, Grosvenor Road, S.W.

F. W. H. DAVIE HARRIS, *Lieut.-Colonel,*
Secretary.

ROYAL ARMY MEDICAL CORPS OFFICERS' BENEVOLENT SOCIETY.

THE Annual General Meeting will be held on Monday, June 14, 1915, at 3 p.m., in the Library at the Royal Army Medical College, Grosvenor Road, S.W.

F. W. H. DAVIE HARRIS, *Lieut.-Colonel,*
Secretary.

ROYAL ARMY MEDICAL COLLEGE.

LIST OF BOOKS ADDED TO THE LIBRARY DURING THE MONTHS OF
JANUARY, FEBRUARY AND MARCH, 1915.

Title of Work and Author	Edition	Date	How obtained
Praktikum der Wasseruntersuchung. Von Professor Dr. O. Emmerling		1914	Library Grant.
Handbuch der Tropenkrankheiten. Von Professor Dr. Carl Mense. Vols. i, ii and iii	2nd	1913-14	" "
The Prophylaxis of Malaria with Special Reference to Military Service. By C. F. Craig, Captain, Medical Corps, U.S. Army		1914	Editor, Journal.
Report of the Surgeon-General, U.S. Army ..		1914	" "
Zanzibar Protectorate: Public Health Report ..		1913	" "
Economic Zoology Report for the Year 1913. By W. M. Aders		1913	" "
The Lister Institute of Preventive Medicine. Collected Papers, No. 10.			
Part 1. Bacteriological, Epidemiological, Pathological and Statistical Papers			
Part 2. Biochemical, Physiological and Zoological Papers		1913-14	" "
Sydney Harbour Trust Commissioners Fourteenth Report		1914	" "
Thirteenth Annual Report of the Institute for Medical Research, Kuala Lumpur, Federated Malay States, 1913		1914	" "
Department of Agriculture, British East Africa, Annual Report, 1912-1913		1914	Commandant's Office.
London County Council. Annual Report of the Council, 1913. Vol. iii. Public Health		1915	" "
Report of the Bombay Bacteriological Laboratory for the Year 1913. By Major W. Glen Liston, C.I.E., I.M.S.		1914	Director, Bombay Bacteriological Laboratory.
Archives of the Middlesex Hospital. Vol. xxxiii. Thirteenth Report from the Cancer Research Laboratories		1914	Middlesex Hospital.
Archives of the Middlesex Hospital. Clinical Series, No. 14		1914	" "
Forty-third Annual Report of the Local Government Board, 1913-1914. Supplement containing the Report of the Medical Officer for 1913-1914		1914	Local Government Board.
Year-book of the Royal Society, 1915		1915	Royal Society.
A Text-book of Radiology. By E. R. Morton, M.D.			Presented by the Author.
On Prophylactic Inoculation against Plague and Pneumonia. By W. M. Haffkine			Presented by Surgeon-General Sir D. Bruce, C.B., F.R.S.
Blackwater Fever in the Tropical African Dependencies, Reports for 1913		1915	" "

ROYAL ARMY MEDICAL CORPS OFFICERS' BENEVOLENT SOCIETY.

PROCEEDINGS OF A COMMITTEE MEETING HELD AT THE WAR OFFICE ON WEDNESDAY,
APRIL 21, 1915, AT 3 P.M.

Present.

Surgeon-General M. W. Russell, for President, in the Chair.
Surgeon-General W. Donovan, C.B.
Colonel Sir James Clark, C.B., Bart.
Lieutenant-Colonel A. B. Cottell.

- (1) The Minutes of the last meeting were read and confirmed.
- (2) It was noted that a donation of £25 had been received from the Medical Insurance Agency, for which the Secretary was directed to send a letter of thanks.
- (3) It was resolved, on the proposal of Surgeon-General Sir Alfred Keogh, that the £25 alluded to in the previous minute should be earmarked for the orphans of officers holding temporary commissions in the R.A.M.C.
- (4) A sum of £10 was voted towards the purchase of a new type machine for the office.

(5) The Committee considered the application for grants for this year and recommended the following:—

Three orphans of Staff-Surgeon D. O. D.	£30
Orphan of Surgeon-Major C. Q.	30
Orphan of Inspector-General D. A.	30
Orphan of Surgeon-General A. S.	20
Orphan of Lieutenant-Colonel H. C.	25
Orphan of Surgeon-General J. O.	40
Orphan of Deputy Inspector-General W. F. I.	40
Orphan of Surgeon-General T. B.	40
Orphan of Surgeon-Major B. C. S.	30
and McGrigor Pension £10	40
Three orphans of Captain G. C.	40
Orphan of Surgeon-General R. A. C.	25
Orphan of J. W. O., A.M.S.	20
Orphan of Deputy Surgeon-General W. T. H.	20
Two orphans of Lieutenant-Colonel W. J. P.	10
Eight orphans of Lieutenant-Colonel J. W.	40
Orphan of Lieutenant-Colonel H. F. E.	10
Orphan of Captain T. S.	10
Two orphans of Captain H. D. O'C.	20
Two orphans of Captain E. M. G.	20
Orphan of Surgeon-General J. F.	30
Orphan of Surgeon-General J. M.	20
Orphan of Captain H. H. S.	10
Orphan of Surgeon-Major W. P. F.	10

£610

F. W. H. DAVIE HARRIS, *Lieutenant-Colonel,*
124, Victoria Street, S.W. *Secretary.*

ROYAL ARMY MEDICAL CORPS FUND.

PROCEEDINGS OF A COMMITTEE MEETING HELD AT THE WAR OFFICE ON WEDNESDAY,
APRIL, 21, 1915, AT 2.30 P.M.

Present.

Surgeon-General M. W. Russell, Vice-Chairman, in the Chair.
Surgeon-General Sir David Bruce, C.B., F.R.S.
Colonel Sir James Clark, C.B., Bt.
Colonel A. Peterkin.
Lieutenant-Colonel W. Pope.
Lieutenant-Colonel W. R. Blackwell.
Captain Wallace Benson.
Captain F. Crookes.

- (1) The Minutes of the last meeting were read and confirmed.

(2) The following grants made to companies from the General Relief Fund during the past quarter were sanctioned—

Name	Age	District	Grant	Total	Remarks
472 Mrs. A. C. ..	38 ..	Woolwich ..	£3 ..	£10 ..	Partial destitution.
473 Mrs. D. ..	26 ..	Cork ..	£3 ..	£3 ..	Destitution.
474 Mrs. E. J. Sh. 67 ..	Netley ..	£3 ..	£22 ..	Destitution.	

(3) With reference to Minute 6 of the last meeting, the Secretary read the correspondence he had received regarding the girl Hilda McDonnell: it was resolved, on the proposal of Sir James Clark, seconded by Sir David Bruce, that assistance be continued for another year.

(4) Lieutenant-Colonel W. Pope proposed, and Lieutenant-Colonel Blackwell seconded, a resolution that the Bandmaster's salary be continued until January next, but that the question be brought up for re-consideration at the October Committee Meeting.—Carried.

(5) A letter from the Army and Navy Male Nurses Co-operation to the War Office, which had been forwarded to the R.A.M.C. Fund, was read, and the Secretary was directed to refer it back to the War Office.

(6) Colonel Pope proposed, and Captain Crookes seconded, a resolution which was carried, that a donation of £5 should be given to the Army and Navy Male Nurses Co-operation.

(7) A sum of £10 was voted towards the purchase of a type-writing machine.

(8) The Secretary was directed to communicate with the Executors of the late Colonel W. Johnston, C.B., with regard to the publication of his work on the History of the Corps.

(9) The question of giving a subscription to the Army Athletic Association was postponed *sine die*.

F. W. H. DAVIE HARRIS, *Lieutenant-Colonel.*
Secretary.

124, Victoria Street, S.W.
April 21, 1915.

WARREN TRIENNIAL PRIZE

MASSACHUSETTS GENERAL HOSPITAL.

THE Warren Triennial Prize was founded by the late Dr. J. Mason Warren in memory of his father, and his will provides that the accumulated interest of the fund shall be awarded every three years to the best dissertation considered worthy of a premium, on some subject in physiology, surgery, or pathological anatomy; the arbitrators being the physicians and surgeons of the Massachusetts General Hospital.

The subject for competition for the year 1916 is on some Special Subject in Physiology, Surgery or Pathology.

Dissertation must be in either the English, French or German languages, and must be typewritten and suitably bound, so as to be easily handled. Work that has been published previously will not be considered in competition. The name of the writer must be enclosed in a sealed envelope, on which must be written a motto corresponding with one on the accompanying dissertation.

Any clue given by the dissertation, or any action on the part of the writer which reveals his name before the award of the prize, will disqualify him from receiving the same.

The amount of the prize for the year 1916 will be \$500.

In case no dissertation is considered sufficiently meritorious, no award will be made. Dissertations will be received until April 14, 1916.

A high value will be placed on original work.

FREDERIC A. WASHBURN,
Resident Physician.

Boston, March, 1915.

OBITUARY.

LIEUTENANT-COLONEL WILLIAM SANDILANDS HARRISON.

LIEUTENANT-COLONEL W. S. HARRISON was the second son of the late Jonathan Atkinson Harrison, M.D., of Haslingden, near Manchester. Born March 15, 1872, he was educated at Haslingden and at Manchester Grammar School. He matriculated at Glasgow University in 1887 and qualified for his degree in 1892 with high commendation. It was necessary for him to wait a year for graduation, until he reached the age of 21.

He spent two years in general practice and passed into the Army Medical Service at the top of his batch in 1895.

At Netley he took the Ranald Martin Prize for Tropical Medicine and the De Chaumont Prize.

In 1897 he proceeded to India and took part in the Tirah Campaign of 1897-98 and unfortunately contracted dysentery in a severe form, from the effects of which he never entirely recovered.

Lieutenant-Colonel Harrison displayed such remarkable scientific attainments in the course of his ordinary hospital work that he was deputed for special duty at the Pasteur Institute, Kasauli, where he worked for two years. On returning to England in the ordinary course of duty he passed through the senior course at the Royal Army Medical College and was granted six months' acceleration of promotion. During the next two years, 1904-06, he was placed on special duty in connexion with the investigation into antityphoid vaccine, and it is largely due to his work, in collaboration with Sir William Leishman, that this measure has achieved such brilliant results in India, and during the present campaign.

His modification of Wright's method of counting the vaccine is familiar to many and has been in constant use as the method for standardizing the vaccine.

In 1906 Harrison was appointed Assistant Professor of Pathology, a position for which he was in every way eminently fitted. He proved himself a patient and thorough teacher and many of the present-day applied scientific methods in medicine are due to the enthusiasm he inspired.

In 1909 he was appointed Professor of Tropical Medicine at the age of 37; in this capacity he proved an able lecturer and most sound clinical teacher, his strong point being the application of exact laboratory methods to the diagnosis and treatment of disease. His lectures and teaching were practical and were illuminated by personal experience and a fund of dry humour. In addition to his routine professorial duties he was invariably employed in some branch of research work, and to mention only one instance his investigation of the rheumatic and allied fevers was most thorough and absolutely reliable, as indeed were all the papers—and they were numerous—bearing his name.

Sir John French in a recent despatch from France refers to the scientific research work done in the field. It is indeed the irony of fate that at the time this very despatch was published the man who as much as any other was in himself the embodiment of this spirit of scientific research in the Army should have been lying on his death bed. It is a consolation to know that although he is gone this spirit which he inspired is with us and calls us to yet higher achievements which will be a monument to his memory.

DEATHS.

POWER.—Lieutenant Pierce Michael Joseph Power, R.A.M.C., died on March 2, 1915, in the field of wounds received in action, aged 27.

BYATT.—On March 11, at Estaires, from wounds received at Neuve Chapelle on March 10, Captain H. V. B. Byatt, Royal Army Medical Corps.

HALL.—Temporary Lieutenant Harry Spencer Hall, R.A.M.C., died at the Central Hospital, Lichfield, on March 14, 1915, aged 35.

HARRISON.—On April 12, at Bankfield, Haslingden, William Sandilands Harrison, Lieutenant-Colonel R.A.M.C., aged 43.

EXCHANGES, &c.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd., 8, Serle Street, London, W.C., not later than the 22nd of the month.

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Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

All such Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the Author notifies at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," War Office, Whitehall, London, S.W.

Communications have been received from Major C. F. Wanhill, Lieutenant and Quartermaster C. H. Withers, Captain C. J. Coppinger, Lieutenant C. H. Treadgold.

The following publications have been received :—

British : *The Indian Medical Journal, Tropical Diseases Bulletin, Medical Press and Circular, Medical Journal of Australia, The Sanitary Record and Municipal Engineering, The Journal of State Medicine, The Lancet, The Hospital, Tropical Veterinary Bulletin, Guy's Hospital Gazette, The Royal Engineers' Journal, The Practitioner, Public Health, St. Bartholomew's Hospital Journal, Red Cross and Ambulance News, The Medical Journal of South Africa, The Indian Medical Gazette, The Medical Review, The Journal of Tropical Medicine and Hygiene, The Bulletin of Entomological Research, The British Journal of Tuberculosis, Proceedings of the Royal Society of Medicine, Commonwealth of Australia (Quarantine Service), The Quarterly Journal of Medicine, The Middlesex Hospital Journal, Journal of the Royal Naval Medical Service, The South African Institute for Medical Research, Transactions of the Society of Tropical Medicine and Hygiene, The Australian Military Journal, The Shield, Reports of the Bombay Bacteriological Laboratory, 1913.*

Foreign : *Bulletin of the Johns Hopkins Hospital, Bulletin de l'Institut Pasteur, The Military Surgeon, Bulletin de la Société de Pathologie Exotique, Norsk Tidsskrift for Militærmedicin, Office International d'Hygiène Publique, Revista de Sanidad Militar, Ninth Report of the Henry Phipps Institute, Giornale di Medicina Militare, The Military Surgeon, United States Medical Bulletin, Le Caducée, Memorias de Instituto Oswaldo Cruz, Annali di Medicina Navale E. Colonaile.*

MANAGER'S NOTICES.

The **JOURNAL OF THE ROYAL ARMY MEDICAL CORPS** is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

The Annual Subscription is £1 (which includes postage), and should commence either on 1st July or 1st January; but if a subscriber wishes to commence at any other month he may do so by paying for the odd months between 1st July and 1st January at the rate of 1s. 8d. (one shilling and eightpence) per copy. (All subscriptions are payable in advance.)

Single copies can be obtained at the rate of 2s. per copy.

The Corps News is also issued separately from the Journal, and can be subscribed for at the rate of 2s. (two shillings) per annum, including postage. Subscriptions should commence from 1st July each year; but if intending subscribers wish to commence from any other month, they may do so by paying for the odd months at the rate of 2d. per copy. (All subscriptions are payable in advance.)

Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager, "Journal of the Royal Army Medical Corps," War Office, Whitehall, London, S.W., and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

It is requested that all Cheques or Postal Orders for Subscriptions to the Journal, Corps News, Reprints, &c., be crossed "Holt & Co.," and made payable to the "Hon. Manager, Journal R.A.M.C.," and not to any individual personally.

All communications for the Hon. Manager regarding subscriptions, etc., should be addressed to

THE HON. MANAGER,
"JOURNAL OF THE ROYAL ARMY MEDICAL CORPS,"
WAR OFFICE, WHITEHALL, S.W.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

FEBRUARY, MARCH AND APRIL, 1915.

HIS MAJESTY THE KING has been graciously pleased to confer the Military Cross on the undermentioned Officer, in recognition of the gallantry and devotion to duty whilst serving with the Expeditionary Force:—

Lieutenant A. C. Hincks, 26th Field Ambulance, Royal Army Medical Corps, Territorial Force (2nd Wessex).

For conspicuous gallantry and devotion to duty at Neuve Chapelle, from March 11 to 14, 1915, in collecting the wounded whilst under heavy fire.

On the night of March 13-14, whilst he was attending on a wounded man, a shell struck the ambulance wagon, killing the man and rendering Lieutenant Hincks unconscious. On recovering he at once proceeded to collect the wounded under fire, and continued doing so throughout the night.

ARMY MEDICAL SERVICE.

The undermentioned Colonels (now Surgeon-Generals) to be temporary Surgeon-Generals:—

Dated November 2, 1914.—Robert Porter, M.B. ; Thomas J. O'Donnell.

ROYAL ARMY MEDICAL CORPS.

The undermentioned Lieutenant-Colonels (now Colonels) to be temporary Colonels:—

Dated October 5, 1914.—George H. Barefoot.

Dated December 17, 1914.—Charles H. Burtchaell, Royal Army Medical Corps.

The undermentioned to be Lieutenant-Colonel:—

Dated March 25, 1915.—Nathan Raw, M.D., late Lieutenant-Colonel, Royal Army Medical Corps, Territorial Force.

Temporary Lieutenant-Colonel (Major, Royal Army Medical Corps, Territorial Force) William A. Turner relinquishes his temporary commission, dated March 29, 1915.

The undermentioned to be granted temporary rank as shown while serving with the Field Ambulance of the Welsh Division.

Lieutenant-Colonels:—

Dated December 2, 1914.—John Edward Henry Davies.

Dated January 6, 1915.—Captain Thomas Price Thomas.

Dated January 9, 1915.—Major Robert John Richard Cobden Simons, Territorial Force.

Dated March 1, 1915.—Major Arthur W. Mayo Robson, C.V.O., F.R.C.S., D.Sc., to be temporary Lieutenant-Colonel.

Dated April 1, 1915.—Harold Andrew Kidd to be temporary Lieutenant-Colonel.

The undermentioned Captains to be Majors, dated February 28, 1915.—Arthur C. H. Gray, M.B.; Douglas P. Watson, M.B.; Thomas S. Dudding; John E. Powell; Osburne Ievers, M.B.; Robert H. MacNicol, M.B.; Hugh H. J. Fawcett; Santiago L. Pallant; Charles R. Sylvester-Bradley; Stanley E. Lewis, M.B.; Gerard A. Kempthorne; James T. McEntire, M.B.; Norman E. Dunkerton; Patrick J. Hanafin; John D. Richmond, M.B.; Marmaduke C. Wetherell, M.D.; Harold C. Hildreth; William MacD. MacDowall, Reginald T. Collins; Thomas J. Wright; Arthur C. Osburn.

The undermentioned to be Majors :—

Dated December 2, 1914.—William Bickerton Edwards.

Dated December 22, 1914.—Samuel Macken, M.D.

Dated March 8, 1915.—Herbert Clifford Barclay, M.D., F.R.C.S.Edin., to be temporary Major.

Dated March 18, 1915.—Alexander George Pemberton Gipps, F.R.C.S., late Fleet Surgeon, Royal Navy, to be temporary Major.

Dated March 24, 1915.—John Francis Cunningham, F.R.C.S.

Dated April 7, 1915.—William Pearson, M.D., F.R.C.S.I.

Dated April 8, 1915.—James Laidlaw Maxwell, M.D.

Lancelot William Robertson, M.B.; Reginald Worth, M.B.

Thomas Caldwell Litler Jones, F.R.C.S.; Major Arthur Augustus Mussen, M.D., Royal Army Medical Corps, Territorial Force.

Dated April 21, 1915.—Temporary Captain Arthur H. Bindloss, M.B., late Lieutenant-Colonel, 9th Battalion, the Middlesex Regiment, Territorial Force.

Dated April 8, 1915.—Bernard Constable Maybury, F.R.C.S., to be temporary Captain whilst serving with the British Red Cross Hospital, Netley.

The undermentioned to be Captains :—

Dated December 2, 1914.—Andrew Woodroffe Anderson, M.B.

Dated January 1, 1915.—Henry Samuel Crighton Starkey, M.B.

Dated January 30, 1915.—Edward Llewelyn Parry Edwards; John Hayward, M.D.; Stanley Raw, M.D.

Dated February 7, 1915.—Frederick Pitcairns Nunneley, M.D.

Dated March 22, 1915.—Hedley Vickers Drew, F.R.C.S.; Ewen Carthew Stabb, F.R.C.S.; Townsend Wharton Shaw, M.B.

Dated March 24, 1915.—Norman George Harry, M.B.

Dated March 25, 1915.—William Paynter Noall, F.R.C.S.

Dated March 29, 1915.—Sheffield Henry Morier Neave.

Arthur O'Neill; Gayton Warwick-Smith, M.D.

The undermentioned to be temporary Captains :—

Dated April 1, 1915.—Thomas Henry Richard Crowle; Gordon Taylor, M.B., F.R.C.S.; Augustus W. Addinsell, M.B.; Leonard B. Cane, M.D., late Captain, Royal Army Medical Corps, Territorial Force Reserve.

Dated April 7, 1915.—John Heatly Spencer, M.B.; Charles Edward Murphy, F.R.C.S.; Gerald Theodore Sylvester Sichel, F.R.C.S.

Dated April 9, 1915.—Hector Munroe, M.B.

Dated April 14, 1915.—John Aldington Gibb, M.D.; Sir Vincent Nash.

Dated January 13, 1915.—David Llewelyn Williams to be temporary Captain whilst serving with the sanitary section of the Welsh Division.

Dated January 29, 1915.—Emrys Roberts to be temporary Captain whilst serving with the Field Ambulances of the Welsh Division.

Dated March 30, 1915.—Captain Robert J. B. Buchanan, from the Half-pay List, is restored to the establishment.

The appointment of Captain Thomas P. Thomas, Territorial Force, to be a temporary Lieutenant-Colonel, is cancelled.

The appointment of Edward L. Parry Edwards to be a temporary Captain is cancelled.

Dated April 10, 1915.—Temporary Lieutenant Malcolm C. B. Grahame, M.B., to be temporary Captain.

The undermentioned to be temporary Lieutenants :—

Dated October 24, 1914.—Alfred John Andrew.

Dated March 12, 1915.—Robert Wilkie Smith, M.B.

Dated March 16, 1915.—Frederick Septimus Walker, M.D.

Dated March 29, 1915.—Fred Phillips, M.B.

Dated March 29, 1915.—Stanley McCoull, M.B.

Dated May 5, 1915.—Francis Hernaman-Johnson, M.D., late Surgeon, Royal Navy; Ernest W. Witham, late Surgeon-Captain, Assam Valley Light Horse.

Dated May 7, 1915.—Lionel Edward Close Norbury ; James Forbes Mackay ; James Duncan Lyle.

The appointment to a temporary Lieutenancy of Alfred Squire Taylor, M.B., which appeared in the *Gazette* of January 29, 1915, is antedated to October 12, 1914.

Dated February 27, 1915.—George Norman Lorimer, M.B. ; Cletus McShane, M.B.

Dated April 3, 1915.—Temporary Lieutenant Frederick J. Stephenson, M.D., relinquishes his commission.

The undermentioned to be temporary Lieutenants :—

Dated November 21, 1914.—Stephen Grange Askey, M.B. ; Percival Courtenay Cole ; Ambrose Wilfred Owen, M.D.

Dated February 7, 1915.—Harold Victor Lamb.

Dated March 1, 1915.—Roland Harry Bebb.

Dated March 1, 1915.—William Thomas.

Dated March 2, 1915.—Arthur John Wilson Compton, M.D.

Dated March 4, 1915.—Arthur Meurig Pryce.

Dated March 8, 1915.—James Leonard Octavius Tilley.

Dated March 9, 1915.—Matthew Edward Robinson, M.B. ; Hugh Noel Murray Puckle, M.B. ; Reginald Morley Clarke, M.B. ; John William Farrar, M.B. ; Alan Thomas Roberts, M.B. ; George Dibbs King Waldron, M.B. ; James Ian Munro Jamieson, M.B. ; William Eric Giblin, M.B. ; William Angwin Edwards, M.B. ; Donald Francis Finlay, M.B. ; Leslie John Jarvis Nye, M.B. ; Lionel Braim Daly, M.B. ; Francis Esmond Keane, M.B. ; George Alexander Birnie, M.B. ; Oswald Barton, M.B. ; George Stanley Phillips ; Martin Ainger Kirton.

Dated March 10, 1915.—William Mary O'Connor, M.B. ; William Wagner Turner, M.B.

Dated March 12, 1915.—Horace Burcham Binks, M.B. ; Alexander Hugh Davidson, M.B. ; Samuel Kenny McKee, M.B. ; Robert Noel Thomson, M.B. ; Arthur Canston Freeth, M.B.

Dated March 14, 1915.—John Vassie Buchanan, M.B.

Dated March 15, 1915.—Michael Louis Neylon ; Edward Holmes Rainey, F.R.C.S. ; Norman Walmesley Steinberg, M.B. ; Henry Harrison Rudolf Bayley ; Lionel Walter Kennedy Scargill, M.B. ; Edward Colston Williams, M.D., F.R.C.S. Edin. ; James Hutchison, M.D. ; John Alexander Douglas Radcliffe, M.B. ; George Riddoch, M.B. ; Victor Joseph McAllister, M.B., F.R.C.S.I. ; William Wilson Thomson, M.B. ; Lawrence Drew Shaw, M.B. ; Arthur Thomas Paterson, M.D., F.R.C.S. Edin.

Dated March 16, 1915.—Russell Vyvyan Steele ; Sidney Ernest Elphick.

Dated March 17, 1915.—John Walker Wood ; John Stewart Caldwell, M.B. ; William Morrison, M.B. ; Rowland Hill Scovell, M.B. ; Owen Henry Bowen ; Joseph Currie Lorraine, M.B., F.R.C.S. Edin. ; William Wilkie Scott, M.B. ; Alfred James Anderson Peters.

Dated March 18, 1915.—Francis William Harrowell, M.B. ; Arthur Cecil Holden.

Dated March 19, 1915.—Thomas Graham Brown, M.D. ; Robert Slaney.

Dated March 20, 1915.—Samuel Caplan ; William Torrance Smith, M.B. ; Arthur MacKintosh, M.B. ; Thomas Ferguson, M.B. ; Phillip Antony Mark Green, M.D. ; Claude Justin Scholtz ; Thomas Miles Moss Horsfall, M.B. ; Joseph Dunbar, M.B. ; Bertram Winter Gonin.

Dated March 21, 1915.—Arthur John Smith, M.B.

Dated March 22, 1915.—Orme Stirling Kellett ; William Edward Picton Phillips ; William Andrew Kennedy, M.D. ; Frederic Senior Turner ; Richard Denis Davy, M.B. ; Harold Joseph Moon ; John Maxwell Fraser, M.D. ; Herbert Owen, M.B. ; Courtenay Charles Weeks ; David Lawrence Tate, M.B. ; Henry Reynolds Brown, M.D.

Dated March 23, 1915.—James Robertson Mitchell, M.B. ; Harold Dyer, F.R.C.S. Edin. ; William Arthur Rees.

Dated March 24, 1915.—Alexander White Robertson ; William Hamilton Allen, M.D. ; Thomas James Joseph Curran, M.D. ; Francis Albert L'Estrange, M.B. ; Charles Mathews.

Dated March 25, 1915.—Harry Dudley ; John Morham McLachlan ; James Haig Johnston ; Hugh Ross Souper, M.B. ; Cecil Burnham, M.B. ; Herbert Ernest Clutterbuck, M.D., F.R.C.S. Edin. ; Sydney Williams.

Dated March 26, 1915.—Robert Edward Franklyn Pearce ; Brian Dodwell Crichton, M.B. ; Herbert Thomas du Heaume ; Wilfred Newell Soden, M.D. ; Harry Fulham-Turner ; John William Robertson, M.D. ; Newman Smith, John Bowman Hunter ; Arnold Reushaw, M.B.

Dated March 27, 1915.—John MacGregor Hartley Reid; Percival Wood; Oscar Gladstone Maginness; George Bertram Bartlett; Edward John Eadie; Richard Brinsley Hunt; Charles Stuart, M.D.; Evan Greene, M.D.; George Robert Lawless, F.R.C.S.I.; Montague Albert Farr; Norman Douglas Mackay, M.D.; Ernest Hamilton Kenny; Hamilton Mathewson, M.B.; Thomas Paterson Noble, M.D.; Arthur Alexander Campbell.

Dated March 28, 1915.—Gwilym Rhys Pennant; Thomas William David; Guy William Parry.

Dated March 29, 1915.—Andrew Rugg Gunn, M.B.; Allan Rigden Finn, M.D., F.R.C.S.; John Lloyd Davies, M.D.; Ernest Weatherhead, M.B.; Vernon Charles Pennell; Reginald Sperling Morshead, M.B.; Richard Gavin Brown, M.B.; George Maurice Caleb Powell; George William FitzHenry; Meilor Bridgman, M.D.

Dated March 30, 1915.—Arthur Edward Gravelle; Theodore Henry Whittington, M.D.; Percy Wilkes Leopold Camps, M.B., F.R.C.S.

Dated March 31, 1915.—Charles Pieter Marais Joubert, M.B.; Thomas Francis Wyse; Harold Bowring; John Miller Woodburn Morison, M.B.; Henry Wallace Jones, M.B.; Ernest Harold Drinkwater.

Dated April 1, 1915.—Ian Mount Grant, M.D.; John Oscar Thomas; Benjamin Theodore Saunders, M.B.; Guy Berners Nicholson; Arthur Russel Reudle, M.D.; George Donaldson Fairley, M.B.; Thomas Baxter Carlyon; Edward Maurice Hime, M.B.; William Henry Sheffield, M.B.; Duncan Wood, F.R.C.S.; Frederick William Woods; John Keay; Kenneth Harrison Alloa Kellie, M.B.; William Gilbertson, M.D.; Ernest Clarkson Bourdas, M.D., F.R.C.S. Edin.; Ernest Percy Satchell, M.B.; Henry St. Arnaud Agate; Howell Wood Barnes, M.B.; John Henry Joseph Davys; John Paton, M.D.; John Moffat Logie, M.B.; James Norman Wheeler, M.B.; Karl Frederick Sountag, M.D.; Hans Anthony Conrad Swertz, M.B.; John Bell Walker; Harold John de Brent; Arthur Dashwood Howard, M.D.; Percy Kitchen; Philip Heywood Hadfield; John Craven Glen; David Gillies; Arthur Emery, M.B.; James Browning Alexander, M.B.; Reginald Williams; Charles Edward Bashall; Charles Allen Robinson, M.B.; John Patrick Howe; Herbert Henry Folker; Leslie Herbert Walsh, M.D.; Frank Bryan, M.B.; Charles Calthorp de Burgh Daly, M.B.; Benjamin Hilton Leigh; Sidney Campbell Dyke; William Newton Parker, M.D.; Thomas William Kelly, M.D.; William Benjamin Heywood, M.D.; Robert Alexander Flynn; William Beck; Eric Reginald Delme Maconochie, M.B., F.R.C.S. Edin.; Charles John Gibson, M.D.; Edward Ferdinand Greene; Ernest Saxton; Sidney Herbert Hall, M.B.; Frederick Guy Bullmore; Hubert Redmayne Sedgwick, M.B.; Ernest Allan, M.B.; John Donald Gunn, M.D., F.R.C.S. Edin.; David Charteris Graham, M.B.; Robert Linton Ritchie, M.B.; Emanuel Mary Joseph O'Farrell, F.R.C.S.I.; William Charles Watson Glenn; James Alexander Gentle, M.B.; John Marchant Fry; John Cecil Rix; George Warwick Deeping, M.B.; William Hutchinson, M.B.; John Wylie, M.B.; Bernard Hugh Stanley Aylward, M.B.; Ernest Augustus Aylward, M.B.

Dated April 2, 1915.—Robert McCheyne Paterson; Walter Haward, M.B.; Bernard Score Browne, M.B.; Charles Butler, M.D.; Robert Moore, M.D.; Andrew Ferguson Horn, M.B.; Robert Denman; John Desmond Gimlette; Ernest Richard Stone; Charles Ewart Dashwood; William Douglas Wilkins, M.B.; William Harvey, M.B.

Dated April 3, 1915.—Harold Bourne Taylor; Henry Brooke Shepherd; William Bertram Lawrence; James Craig, M.D.; Andrew Hardie McKenzie, M.B.; Philip Augustine McCarthy, M.D.; William Arnison Slater; Harry Grey, M.D.; Wilfred Aubrey Rowe.

Dated April 3, 1915.—Edwin William Sidney Martin, M.B.

Dated April 6, 1915.—Donald Fisher, M.B.; William John Francis Symons, M.B.; Richard Albert Banbury; John Connell, M.B.; James Benjamin Houghton Dawson; Thomas Johnston; Ambrose Pode Yonge, M.B.; William John Hill, M.B.; Arthur George Southcombe, M.D.; Wilfred Vedal Robinson; John Henry Sheldon, M.B.; Evan John Goronwy Jones, M.D.

Dated April 7, 1915.—David Riddell, M.D.; Ernest Emrys Isaac; Cuthbert John Nicholson; Frederick Talbot Driffield Clindening; Ninian McIntire Falkner, M.D.; Reginald Torriano Cooke; James Wodderspoon Bennett; Adolphe Abraham, M.D.; Max Hershel Edward Richard Montesole, M.B.; Hubert Vere Leigh, M.B.; Roger Llewellyn Williams; John William Heckes; Thomas Dinneen Jago; Cecil Hutchinson Hopwood, M.B.; William Frederick Abbott; Ernest Wardham Milne, M.B.; Arthur James Henry Eoyton; Clarence Brian Dobell, M.D.; Frederick Aylmer Hort, M.D.; Ian Campbell; Harry Crichton, M.D.; Thomas Fearnhead; Charles Launder Chalk;

Frank Louis Underwood; Everard M. le Poer Power; Martin Remers; George Burrows Brown, M.B.; Duncan MacNab Callender, M.B., F.R.C.S.Edin.; Lauchlan Rose, M.D.; John Brown, M.D.; William Douglas Knocker, M.B.; John Murdo MacPhail, M.D.; George Aubrey Jelly, F.R.C.S.Edin.; William Kirk, M.D.; Charles Fortescue Pridhan; Robert Michail Forde; Thomas Paul Gray, M.D.; John Ross Hoare Ross, M.B.; Anthony Ashley Cooper; John Musgrave Twentyman, M.B.; Ernest Morley Rooke; Charles Augustus Farrell; Marshall Hall; Alfred Ernest Carsberg, M.D.; Reginald Wilton Trevor Clampett, M.B.; George Howard Strettell Letchworth; Francis Sidney Mitchell; Claude Ernest Willington Wilmot, M.D.; Edward Chapman Wallace; Robert Morrison Clarke, M.B.; Robert Maxwell Chance, M.D.; Harold Arthur Upward, M.B.; Henry Herbert Clarke, M.D.; George Min Adam, M.B.

Dated April 8, 1915.—Ernest Villiers Hunter; John Black Mason, M.B.; Cuthbert John Butler; Benjamin Sweeter, M.B.; Henry Hope Knox Sparrow; William Leggett, M.D.; John Thomas Hurst, M.B.; Benjamin Banks Ferrar, M.D.; Robert Buchanan, M.B.; William Wilfred Banham; John Henry Blakeney; Robert Scott Dewar, M.B.; Cyril Herbert Thomas Iltott, M.B.; George Maxwell Elliott, M.B.; James Arthur Richard Lee; Alexander Charles Profeit, M.D.; Robert Alexander Garden Whiting; Fife Slater, M.B.; Isaac Alexander Davidson, M.D.; Norman Grenville Walsh Davidson.

Dated April 9, 1915.—Robert Mitchell MacKay, M.B.; Stanley James Annear Beale, M.B.; Edward Alban Evans; William Macdonald, M.D.; Thomas Arthur Fuller, M.B.

Dated April 10, 1915.—Ralph Christopher Fuller; Frederick Michael Kirwan; William Edmund Cooke, M.D.; William Henry Hooton; George Frederick Holt; Frank Jerome Dunne, M.B.; Alexander John Campbell, M.D.; Finlay Stewart Campbell, M.B.; Andrew Adams Rutherford, M.B.; David McKinlay Reid, M.D.; Henry Harold Robinson; Gerald Irving Moriarty, M.B.; Hugh Tennant Prince; Augustus William Tabuteau, F.R.C.S.I.; Cyril William Jenner; John Harold Mason, M.B.; William Walter Dickson, M.B.

Dated April 12, 1915.—John Stephen Herbert Lewis, M.B.; Redcliffe Nathan Salaman, M.D.; John Travers McConkey; Charles Alfred Whiting Pope, M.B.; Wallace Tynemouth Hedley, M.B.; Edward Henry Pollock Brunton; Thomas Strain, M.D.; Andrew Graham Ritchie, M.B.; George Albert Simpson; Daniel Cowin, M.B.; William Southmead Langworthy.

Dated April 13, 1915.—Robert Richards; William Christopher Gavin, M.B.; John Milnes Pooley; Edmund William Lynch.

Dated April 14, 1915.—William Alister Alexander, M.B.; Percy Ellwand Middleton; Wilfred Edgecumbe Burrows, M.D.; Walter Salisbury, M.B.; Herbert John Hickin, M.B.; Frank Brickwell, M.B.; Alexander Elmslie Campbell, M.B.; Charles James Armstrong-Dash, M.D.; Ernest George Klumpp, M.B.; Victor Harold Mason, M.B.; Ian Macfarlane, M.B.; Henry Edward O'Brien.

Dated May 4, 1915.—Albert T. Duka, D.S.O.

The Commission as temporary Lieutenant granted to Paul René Loubet under the name of Percy Webber Black in the *Gazette* of September 15, 1914, is cancelled.

The date of appointment of Frederick Samuel Rowland to be a temporary Lieutenant is December 12, 1914, and not as stated in the *Gazette* of March 30, 1915.

Temporary Captain F. Armstrong, having ceased to serve with the Welsh Hospital, relinquishes his commission, dated March 31, 1915.

Temporary Lieutenant John Kelly relinquishes his commission, dated March 1, 1915.

Temporary Lieutenant Edward M. Woodman relinquishes his temporary commission, dated January 25, 1915. (Substituted for the notification which appeared in the *Gazette* of January 8, 1915.)

The name of temporary Lieutenant James Randolph Gyllencreutz is as now described, and not as stated in the *Gazette* of September 25, 1914.

James Erlank, M.B., is granted temporarily the honorary rank of Lieutenant whilst serving with the Duchess of Westminster's War Hospital, dated May 6, 1915.

Temporary Lieutenant Charles Gibson, having ceased duty with the British Red Cross Hospital, Netley, relinquishes his commission, dated April 19, 1915.

Lieutenant Charles B. Pearson, having ceased to serve with the British Red Cross Hospital, relinquishes his temporary commission, dated May 7, 1915.

Temporary Lieutenant Raymond J. Jones relinquishes his commission, dated February 28, 1915.

Temporary Lieutenant Edward M. Hime, M.B., relinquishes his commission, dated April 27, 1915.

Quartermaster and Honorary Captain Frederick William Hall, Royal Army Medical Corps, to be Honorary Major, dated April 13, 1915.

Quartermaster and Honorary Lieutenant Frank Castle Fletcher, from the Territorial Force Reserve, to be Quartermaster, with the honorary rank of Lieutenant, dated March 12, 1915.

The undermentioned Serjeant-Majors to be Quartermasters, with the Honorary rank of Lieutenant, dated February 6, 1915 :—

Alexander William Grant.
Richard Cox.
Edwin Bennett.
Joseph David Genese.
George Abel Collier.

Alexander James Fitch.
Arthur George Audus.
Charles John Yeates.
Arthur Thomas Hasler.
Walter John Tite.

The undermentioned Serjeant-Majors to be Quartermasters, with the Honorary rank of Lieutenant, dated February 21, 1915 :—

James Francis Hughes.
John Banks.
Robert Joseph Fleming.
William Hugh Storey.
Fred Davis.
George William Carnell.
Harry Benjamin Lee.
Thomas Edward Coggon.

Henry John Polhill.
Arthur Bennett.
William Paul Conolly.
Edward Haynes.
Robert Spencer.
William Cox.
Charles Ward.

The undermentioned to be temporary Quartermasters with the honorary rank of Lieutenant :—

Dated December 2, 1914.—Philip Stephens Thompson.

Dated February 7, 1915.—Alfred Francis Norris.

Dated March 15, 1915.—John Reginald Kenshole.

Dated March 18, 1915.—Thomas Brina.

Dated March 20, 1915.—James Varley.

Dated March 21, 1915.—George John Lander.

Dated March 22, 1915.—Thomas Hedley.

Dated March 23, 1915.—Wilfred Norman Speedy; Charles Hunt; Robert Leslie Masters.

Dated March 26, 1915.—Richard Moffatt.

Dated April 6, 1915.—Henry Porter.

Dated April 7, 1915.—William Tuson.

Dated April 8, 1915.—George William Petch.

Dated April 10, 1915.—George Thomas Cooper.

Dated April 10, 1915.—Martin Powell.

Dated April 13, 1915.—James Carter.

Dated April 16, 1915.—Henry Duff.

The undermentioned Serjeant-Majors to be Quartermasters, with the honorary rank of Lieutenant :—

Dated April 13, 1915.—Ernest Henry Rossiter; James Thomas Starkie; Edward Kerstein; Thomas Connolly; Robert Ernest Manwaring; John Enwright; John Wingfield Willsher; George Sellex; Benjamin Disraeli Conolly; Hugh William Rose.

ROYAL ARMY MEDICAL CORPS.—SPECIAL RESERVE.

TERRITORIAL FORCE.

The undermentioned Lieutenants are confirmed in their rank : William B. Jepson; Noel H. W. Saw.

Percy Barnard Corbett to be Lieutenant.

Peter MacCallum, Cadet of the Officers Training Corps, to be Lieutenant (on probation).

Dated March 25, 1915.—Clive Franklyn Collett; Reginald Maximilian Murray; Gerald Merton.

Captain Philip N. Button resigns his commission on appointment as temporary Surgeon, Royal Navy, dated April 5, 1915.

Lieutenant James T. Cameron resigns his commission, dated May 7, 1915.

Lieutenant James McCusker is dismissed from His Majesty's Service by sentence of a General Court Martial, dated February 26, 1915.

TERRITORIAL FORCE.

Eastern Mounted Brigade Field Ambulance.—Captain Claudius G. K. Sharp, M.B., to be temporary Major, dated April 20, 1915.

1st Eastern General Hospital.—James Christian Simpson, M.D., to be Captain, whose services will be available on mobilization, dated March 22, 1915. Robertson Campbell Canney (late Cadet Corporal, London University Contingent, Senior Division, Officers Training Corps) to be Captain, whose services will be available on mobilization, dated March 22, 1915. Major Laurence Humphry, M.D., to be temporary Lieutenant-Colonel, dated April 20, 1915. Lieutenant Ffrangcon Roberts, from 1st East Anglian Field Ambulance, to be Lieutenant, dated April 24, 1915.

Lieutenant-Colonel Ernest O. Wight, from Deputy Assistant Director of Medical Services, Home Counties Division, to be Assistant Director of Medical Services, West Riding Division, with the rank of Colonel, dated April 14, 1915.

Lieutenant-Colonel Arthur Lloyd Jones (late 3rd Welsh Field Ambulance) to be Lieutenant-Colonel, dated January 1, 1915.

2nd Eastern General Hospital.—Harold Harris Elborough Scatliff (late Captain Sussex Royal Garrison Artillery) to be Captain, whose services will be available on mobilization (temporary), dated May 2, 1915.

1st Northern General Hospital.—The undermentioned to be Lieutenants, dated February 9, 1915: Norman Hodgson, M.B.; Frederick John Natrass, M.B.; Sydney Thompson, M.B.; Captain George Hall, M.D., to be Major, and to be seconded, dated March 25, 1915; Thomas Whitelaw, M.B., to be Lieutenant, dated April 20, 1915; Stuart McDonald, M.D., F.R.C.P. (late Captain, Unattached List for the Territorial Force), to be Captain, whose services will be available on mobilization, dated April 24, 1915; Major Robert A. Bolam, M.D., to be temporary Lieutenant-Colonel, dated February 1, 1915. The undermentioned to be Lieutenants dated April 1, 1915: Sydney Havelock, M.B.; Charles Henry Keay, M.B. (late Cadet Lance-Corporal, Durham University Contingent, Senior Division, Officers Training Corps).

2nd Northern General Hospital.—Major Sir Berkely G. A. Moynihan, M.B., F.R.C.S., is seconded, dated November 28, 1914.

3rd Northern General Hospital.—James Clark, M.D., to be Captain, whose services will be available on mobilization, dated March 18, 1915. The undermentioned to be Lieutenants: Balfour McKean, M.D., dated March 19, 1915; Robert Pringle Anderson, M.B., dated March 24, 1915.

1st Southern General Hospital.—Eric Walter Assinder, M.B., to be Captain (temporary), dated March 15, 1915; Arthur Christopher Tibbits to be Lieutenant, dated April 6, 1915; Captain Frank D. Marsh is seconded, dated April 15, 1915; Bertram Arthur Lloyd to be Captain, whose services will be available on mobilization, dated April 24, 1915.

2nd Southern General Hospital.—Major James Swain, M.D., F.R.C.S., is seconded, dated December 1, 1914; Captain Francis H. Edgeworth, M.B., to be Major, dated December 6, 1914. The undermentioned to be Captains, whose services will be available on mobilization, dated April 16, 1915: John Alexander Nixon, M.B., F.R.C.P. (late Captain of this Unit); John Roger Charles, M.D., F.R.C.P. (late Lieutenant, 1st South Midland Brigade, Royal Field Artillery); Charles Ferrier Walters, F.R.C.S. (late Lieutenant, 3rd South Midland Field Ambulance); Clifford Arthur Moore, M.B.; Arthur Rendle Short, M.D.; Arthur Launcelot Flemming (late Major of this Unit).

3rd Southern General Hospital.—The undermentioned officers are seconded under paragraph 112, Territorial Force Regulations, dated April 11, 1915: Lieutenant-Colonels William T. Freeman, M.D., F.R.C.S., and William J. Maurice, M.B.; Majors George S. Abram, M.B.; Lansdown M. Guilding, M.B.; John A. P. Price, M.D., and Robert Ritson; Captains Norton B. Clowes, George H. R. Holden, M.D., George F. Murrell, M.B., Walter B. Secretan, M.B., F.R.C.S., and Fielding Clarke; William Stobie, M.B., to be Lieutenant, dated May 7, 1915.

5th Southern General Hospital.—Major William P. Purvis, M.D., F.R.C.S., is seconded, dated March 13, 1915.

5th Northern General Hospital.—Captain Bernard Stracey, M.B., from the North Midland Casualty Clearing Station, to be Captain, whose services will be available on mobilization, dated May 5, 1915; Lieutenant-Colonel George C. Franklin, F.R.C.S., relinquishes his commission, dated May 6, 1915.

Highland Mounted Brigade Field Ambulance.—The date of appointment as Transport Officer and Honorary Lieutenant of Hector McIver is February 15, 1915, and not as stated in the *London Gazette* of March 17, 1915; George Munro McLeod to be Lieutenant, dated March 21, 1915; David Dunn Mackay, M.B., to be Lieutenant, dated March 22, 1915.

Scottish Horse Mounted Brigade Field Ambulance.—Frederick George Harper, M.D. (late Lieutenant, Royal Army Medical Corps Territorial Force), to be Lieutenant, dated March 1, 1915.

1st Scottish General Hospital.—Captain Middleton Connon, M.D., from Sanitary Service, to be Captain, whose services will be available on mobilization, dated February 16, 1915. Major Henry McI. W. Gray, M.B., F.R.C.S. Edin., is seconded, dated February 1, 1915.

2nd Scottish General Hospital.—James Miller, M.D., F.R.C.P. Edin., to be Captain, whose services will be available on mobilization, dated December 9, 1914.

1st Highland Field Ambulance.—Thomas Gibb to be Quartermaster, with the honorary rank of Lieutenant, dated April 14, 1915; Gunner John Reid, from the North Scottish Royal Garrison Artillery, to be Transport Officer, with the honorary rank of Lieutenant, dated April 20, 1915.

2nd Highland Field Ambulance.—Benjamin James Alcock, M.B., to be Lieutenant, dated March 3, 1915.

3rd Highland Field Ambulance.—Acting Serjeant-Major John Fraser Wood to be Quartermaster with the honorary rank of Lieutenant, dated April 7, 1915.

Lowland Mounted Brigade Field Ambulance.—The date of appointment of Transport Officer and Honorary Lieutenant William Walker is December 30, 1914, and not as stated in *London Gazette* of March 13, 1915.

3rd Lowland Field Ambulance.—Lieutenant Archibald C. McMaster, M.B., to be Captain, dated December 28, 1914; George James Linklater, M.B., to be Lieutenant, dated March 18, 1915.

Highland Casualty Clearing Station.—The undermentioned to be Lieutenants, dated April 25, 1915: Joseph Ellis Milne, M.D.; Charles Forbes, M.B.; Alexander Jaffrey Presslie, M.B.

1st South Western Mounted Brigade Field Ambulance.—William Arnold Milner to be Lieutenant, dated April 10, 1915.

2nd Western General Hospital.—Captain Wilson H. P. Hey, M.B., F.R.C.S., is seconded for service with No. 18 Field Ambulance, Royal Army Medical Corps, Special Reserve, dated April 14, 1915; Captain Charles Roberts, M.B., from 1st East Lancashire Field Ambulance, to be Captain, dated April 14, 1915; Charles Paget Lapage, M.D. (late Captain, Unattached List for the Territorial Force), to be Captain, dated April 25, 1915.

3rd Western General Hospital.—Lieutenant Ivor J. Davies, M.D., from 2nd Welsh Field Ambulance, to be Lieutenant, dated April 24, 1915; Thomas Rufus Bowen to be Lieutenant, dated March 10, 1915.

1st Lowland Field Ambulance.—Captain John W. Leitch, M.B., to be temporary Major, dated December 21, 1914; Quartermaster and Honorary Major James Kenny is seconded, dated May 4, 1915.

Lowland Casualty Clearing Station.—Lieutenant Geoffrey B. Fleming, M.B., to be Captain, dated March 22, 1915.

East Anglian Casualty Clearing Station.—Frederick William Lewis to be Lieutenant, dated February 11, 1915; Major Francis J. Warwick, M.B., from attached to Units other than Medical Units, to be Major, with precedence as in the Territorial Force, dated April 15, 1915; Robert Charles Standring Smith, M.B., to be Lieutenant, dated April 9, 1915; William Joseph Deighan to be Lieutenant, dated April 30, 1915.

3rd East Anglian Field Ambulance.—The undermentioned to be Lieutenants, dated April 7, 1915; Alexander Cuffe, M.D., F.R.C.S., Edward Knox Goodwin, Captain Samuel Hughes, M.B., from 5th Southern General Hospital, to be Captain (temporary), dated April 9, 1915; John Norman Robins to be Lieutenant, dated March 10, 1915; Captain James Turtle to be temporary Major, dated April 10, 1915.

1st Northumbrian Field Ambulance.—Acting Serjeant-Major Joseph Stanley Brown to be Quartermaster, with the honorary rank of Lieutenant, dated March 17, 1915.

2nd Northumbrian Field Ambulance.—Herbert Bruce Low, M.D. (late Captain, 7th Battalion, Durham Light Infantry), to be Captain (temporary), dated April 9, 1915; William Arthur Benson (late Captain, 8th Battalion, The Durham Light Infantry) to be Lieutenant-Colonel (temporary), dated April 17, 1915; John Percy Race to be Lieutenant, dated March 22, 1915; John McDonald Nicoll, M.B. (late Major, 7th Battalion, The Durham Light Infantry), to be Major (temporary), dated April 24, 1915. James Gill Hill, M.B., to be Lieutenant, dated March 24, 1915; Cecil Dermot Rogers, M.B., to be Lieutenant, dated May 7, 1915.

3rd Northumbrian Field Ambulance.—Captain Arthur Tinley Sissons, M.B., from the Territorial Force Reserve, Royal Army Medical Corps, to be Captain (temporary), dated March 26, 1915. Robert Raffle, M.B., to be Lieutenant, dated April 8, 1915.

Northumbrian Casualty Clearing Station.—William Albert Wetwan (late Major, 5th Battalion, Alexandra, Princess of Wales's Own Yorkshire Regiment) to be Major (temporary), dated April 25, 1915; Harold Muir Evans, M.D. (late Surgeon-Captain, 1st Norfolk Volunteers, Artillery), to be Major (temporary), dated May 5, 1915; Second Lieutenant Colin Mearns, M.B., from The Durham Light Infantry, to be Lieutenant, dated March 19, 1915.

Northumbrian Divisional Sanitary Section.—Lieutenant Sydney J. Clegg, M.B., from attached to Units other than Medical Units, to be Lieutenant, dated March 16, 1915.

1st North Midland Field Ambulance.—Lieutenant Geoffrey Holmes, M.B., to be Captain (temporary), dated March 3, 1915; Major Henry G. W. Dawson, M.B., to be Lieutenant-Colonel (temporary), dated March 10, 1915. Transport Officer and Honorary Lieutenant Henry A. Piggin resigns his commission, dated May 5, 1915; Lieutenant Kenneth B. Clarke, from the Eastern Mounted Brigade Field Ambulance, to be Lieutenant, dated May 5, 1915; Quartermaster-Serjeant Thomas Barradell to be Quartermaster, with the honorary rank of Lieutenant, dated May 5, 1915.

2nd North Midland Field Ambulance.—Major John C. S. Burkitt, M.D., from attached to Units other than Medical Units, to be Major (temporary), dated April 25, 1915; Richard Dudley Collard to be Transport Officer, with the honorary rank of Lieutenant, dated January 9, 1915; Transport Officer and Honorary Lieutenant Richard D. Collard relinquishes his commission, dated March 5, 1915.

North Midland Casualty Clearing Station.—Henry Crook Bevan to be Lieutenant, dated March 23, 1915.

South Midland Casualty Clearing Station.—Major Peverell S. Hichens, M.D., from attached to Units other than Medical Units, to be Major, dated March 22, 1915; Alfred Heeley Brindley to be Quartermaster, with the honorary rank of Lieutenant, dated May 5, 1915.

1st East Anglian Field Ambulance.—Lieutenant Gilbert C. Gray to be temporary Captain, dated April 12, 1915; Henry Edward Rolfe to be Transport Officer with the honorary rank of Lieutenant, dated March 5, 1915.

1st East Lancashire Field Ambulance.—Captain Charles Roberts, M.B., is restored to the establishment, dated April 14, 1915.

2nd East Lancashire Field Ambulance.—William Clegg-Newton to be Lieutenant, dated March 10, 1915; Graham Stevenson, M.B., to be Lieutenant, dated April 1, 1915.

3rd East Lancashire Field Ambulance.—Lieutenant William J. Reid, M.B., to be Captain, and to remain seconded, dated September 18, 1914; William Calverley, M.B., to be Lieutenant, dated March 20, 1915.

London Mounted Brigade Field Ambulance.—Private Ronald Douglas Stuart Mar, Lord Cardross (late Lieutenant, Scots Guards), to be Transport Officer, with the honorary rank of Lieutenant, dated April 24, 1915.

1st London (City of London) Field Ambulance.—Captain Andrew Elliot, M.D., to be temporary Major, dated April 24, 1915; Lieutenant Arthur D. J. B. Williams to be Captain, and to remain seconded, dated August 11, 1914; Quartermaster-Serjeant Robert James Tytler, from the 2nd London (City of London) General Hospital, to be Quartermaster, with the honorary rank of Lieutenant, dated May 5, 1915.

1st London (City of London) General Hospital.—The Christian names of Captain Henry Edmund Gaskin Boyle are as now stated, and not as announced in the *London*

Gazette of September 4, 1914; William Farrer Thompson to be Lieutenant, dated April 20, 1915.

1st London (City of London) Sanitary Company.—Lionel Watson Hignett, M.B., to be Lieutenant, dated February 23, 1915; Henry Holroyd, M.B., to be Lieutenant, dated March 15, 1915; Daniel McPherson Taylor, M.D., to be Lieutenant, dated March 29, 1915.

1st London Casualty Clearing Station.—Cecil Arthur Robinson to be Lieutenant, dated April 10, 1915.

2nd London (City of London) Field Ambulance.—Transport Officer and Honorary Lieutenant Frank S. Turner to be Transport Officer, with the honorary rank of Captain, dated December 26, 1914; William Travers Homan to be Lieutenant, dated April 7, 1915; Arthur Hardwicke Platt to be Lieutenant, dated April 24, 1915.

2nd London (City of London) General Hospital.—Captain Edwin H. Fenwick, F.R.C.S., to be Lieutenant-Colonel (temporary), and is seconded, dated April 14, 1915.

2nd London Sanitary Company.—Herbert Beene to be Lieutenant, dated March 18, 1915; Frederick John James Ney to be Lieutenant, dated March 19, 1915; Captain Reginald O. Sibley, M.D., from the 4th London General Hospital, to be Captain, dated April 10, 1915; Owen Herbert Peters, M.B., to be Lieutenant, dated May 7, 1915.

2nd London Casualty Clearing Station.—Acting Serjeant-Major Henry Arthur Charles Cole, from the 1st London Casualty Clearing Station, to be Quartermaster, with the honorary rank of Lieutenant, dated April 24, 1915.

2nd London Sanitary Company.—Sidney Herbert Daukes, M.B., to be Lieutenant, dated March 2, 1915.

3rd London General Hospital.—Major Sir John R. Bradford, K.C.M.G., C.B. F.R.S., M.D., is seconded, dated October 10, 1914; Major Arthur W. Mayo Robson, C.V.O., F.R.C.S., is seconded, dated March 1, 1915; Hugh Morriston Davies, F.R.C.S., to be Captain, whose services will be available on mobilization, dated March 19, 1915; Ernest Neville Keys-Wells, M.B., to be Captain, whose services will be available on mobilization, dated March 19, 1915; the undermentioned to be Captains, whose services will be available on mobilization, dated March 19, 1915: Gwynne Evan Owen Williams, M.D., Charles Aubrey Pannett, M.B.; Wilfred Batten Lewis Trotter, M.D., to be Captain, whose services will be available on mobilization, dated March 22, 1915.

4th London General Hospital.—The following announcement is substituted for that which appeared in the *London Gazette* of March 8, 1915: George Arthur Ewart to be Captain, whose services will be available on mobilization, dated January 4, 1915.

4th London Field Ambulance.—Major Mowbray Taylor, M.B., from the 5th London Field Ambulance, to be Lieutenant-Colonel (temporary), dated April 21, 1915.

5th London Field Ambulance.—Captain John H. Dixon, M.D., from London Mounted Brigade Field Ambulance, to be Captain, dated March 3, 1915.

6th London Field Ambulance.—Quartermaster-Serjeant Reginald Ramson Whitty to be Quartermaster, with the honorary rank of Lieutenant, dated March 15, 1915.

London Mounted Brigade Field Ambulance.—Captain William P. Thomas, M.D., to be temporary Major, dated April 2, 1915.

2nd London Casualty Clearing Station.—Athelstan Jasper Blaxland, F.R.C.S., to be Captain (temporary), dated March 26, 1915.

2nd London (City of London) General Hospital.—The undermentioned Officers are seconded: Major Sir Frederick S. Eve, F.R.C.S., dated December 1, 1914; Captain Sir William A. Lane, Bt., M.B., F.R.C.S., dated November 22, 1914; Captain Sir Bertrand E. Dawson, K.C.V.O., M.D., dated November 21, 1914.

4th London General Hospital.—Captain William Hunter, M.D., F.R.C.P., is seconded, dated February 12, 1915; Francis Whittaker Tunnicliffe, M.B., to be Captain, whose services will be available on mobilization, dated March 17, 1915.

1st South Midland Field Ambulance.—Transport Officer and Honorary Lieutenant Gerard T. A. Uthwatt resigns his commission, dated March 12, 1915; William James Hirst, M.B., to be Lieutenant, dated March 17, 1915; Edmund Whichello, M.B., to be Lieutenant, dated April 16, 1915.

2nd South Midland Mounted Brigade Field Ambulance.—The date of appointment of Lieutenant Alexander Rodger, M.B., is February 14, 1915, and not as stated in the *London Gazette* of March 13, 1915.

3rd South Midland Field Ambulance.—Captain Charles Corfield, from attached to Units other than Medical Units, to be Captain, dated April 7, 1915; Arthur Stanley Brookes to be Quartermaster, with the honorary rank of Lieutenant, dated April 10, 1915; David McVea Fleck, M.B., to be Lieutenant, dated April 12, 1915.

South Midland Casualty Clearing Station.—Lieutenant-Colonel William H. Stephen, M.B., from 1st South Midland Mounted Brigade Field Ambulance to be Lieutenant-Colonel, dated March 17, 1915; William Albert Higgins, M.D., to be Lieutenant, dated March 20, 1915.

3rd Home Counties Field Ambulance.—Walter Perry Barringer to be Transport Officer with the honorary rank of Lieutenant, dated April 15, 1915.

2nd Welsh Field Ambulance.—John Phillip Henry Davies to be Lieutenant, dated December 18, 1914.

3rd Welsh Field Ambulance.—John Evans, M.D. (late Captain, 6th Battalion, The Royal Welsh Fusiliers), to be Major (temporary), dated April 24, 1915.

Notts and Derby Mounted Brigade Field Ambulance.—Private Hugh Valentine Sherringham, from the Norfolk (King's Own Royal Regiment) Yeomanry, to be Transport Officer, with the honorary rank of Lieutenant, dated April 8, 1915.

South Eastern Mounted Brigade Field Ambulance.—Transport Officer and Honorary Lieutenant Samuel R. T. A. M. Williams resigns his commission, dated April 24, 1915.

1st West Lancashire Field Ambulance.—The date of appointment of Arthur Pinnington as Quartermaster and Honorary Lieutenant is October 14, 1914, and not as stated in the *London Gazette* of January 7, 1915; Leonard Boole Stott, M.B., to be Lieutenant, dated March 16, 1915.

1st East Lancashire Field Ambulance.—Lieutenant Henry E. Fox, M.B., from attached to Units other than Medical Units, to be Lieutenant, dated January 14, 1915.

2nd West Riding Field Ambulance.—The date of appointment of Lieutenant Digby W. Hardy, M.B., is December 27, 1914, and not as stated in the *London Gazette* of January 16, 1915; Quartermaster-Serjeant Thomas Richard Brown to be Quartermaster, with the honorary rank of Lieutenant, dated April 25, 1915.

West Riding Casualty Clearing Station.—The undermentioned Lieutenants from the 2nd West Riding Field Ambulance, to be Lieutenants, dated December 31, 1914: Robert G. Dixon, M.B.; Hubert W. Symons, M.B.; Peter McEwan, M.B., F.R.C.S. Edin., to be Lieutenant, dated April 12, 1915.

West Riding Divisional Sanitary Section.—Surgeon-Captain Harold F. Horne, M.D., from the 5th Battalion, The York and Lancaster Regiment, to be Captain, dated April 7, 1915.

3rd West Riding Field Ambulance.—Captain William S. Kerr, M.B., F.R.C.S., to be temporary Major, dated March 16, 1915; Serjeant-Major Joseph William James Woolley to be Quartermaster, with the honorary rank of Lieutenant, dated April 25, 1915.

Welsh Border Mounted Brigade Field Ambulance.—John Arthur Eyton-Jones (late Surgeon-Lieutenant, 1st Volunteer Battalion, Royal Welsh Fusiliers) to be Captain (temporary), dated March 25, 1915.

3rd Welsh Field Ambulance.—John William Dale, M.B., to be Lieutenant, dated March 3, 1915.

1st Home Counties Field Ambulance.—Henry George Lynwood Allford (late Captain, Territorial Force Reserve, General List) to be Captain (temporary), dated April 26, 1915.

Sanitary Service.—Henry Louis Powell Hulbert, M.B., to be Captain, and to be appointed Sanitary Officer, South Midland Reserve Division, dated March 1, 1915; Captain Robert Proudfoot, M.D., from attached to Units other than Medical Units, to be Sanitary Officer, Welsh Territorial Division, dated March 19, 1915; Frederick Thomas Churchill Linton, M.B., to be Captain, whose services will be available on mobilization, dated April 20, 1915.

Arthur Hamilton Lowe, M.B., to be Captain, whose services will be available on mobilization, dated May 7, 1915.

The date of appointment of Captain George H. Weston, M.B., is December 9, 1914, and not as stated in the *London Gazette* of February 13, 1915.

The following announcement is substituted for that which appeared in the *London Gazette* on February 15, 1915:—

Transport Officer and Honorary Captain Frank S. Turner, from the 2nd London (City of London) Field Ambulance, to be Transport Officer with the honorary rank of Captain, dated February 16, 1915.

ATTACHED TO UNITS OTHER THAN MEDICAL UNITS.

The date of appointment of Lieutenant Frederick Hunton, M.D., is December 17, 1914, and not as stated in the *London Gazette* of January 4, 1915.

- Thomas Dobson Bell to be Lieutenant, dated October 6, 1914.
 Lieutenant Alistair Robertson Grant, M.B., from 2nd Highland Field Ambulance, to be Lieutenant, dated February 18, 1915.
- The announcement of the appointment of Cecil Randle Harper as Lieutenant, which appeared in the *London Gazette* of March 1, 1915, is cancelled.
- Robert Lucius Wood, M.B., to be Lieutenant, dated March 4, 1915.
- Surgeon-Captain George Symers Mill, M.D., from the 4th Battalion, The King's Own (Yorkshire Light Infantry), to be Major, dated March 7, 1915.
- Thomas Frankish, M.B. (late Lieutenant-Colonel, 1st East Lancashire Brigade, Royal Field Artillery), to be Major, dated March 9, 1915.
- Lieutenant Oskar Teichmann to be Captain, dated March 16, 1915.
- James Mathews Heron to be Lieutenant, dated March 18, 1915.
- Reginald Devereux Moore to be Lieutenant, dated March 22, 1915.
- Thomas Porter, M.B., to be Lieutenant, dated March 23, 1915.
- Lieutenant Horsley Drummond, M.B., to be Captain, dated March 24, 1915.
- Lieutenant Percival T. Rutherford to be Captain, dated March 24, 1915.
- Captain Henry W. Williams, M.D., to be Major, dated March 25, 1915.
- John Macquarrie, M.B., to be Lieutenant, dated April 1, 1915.
- Captain Charles J. I. Krumbholz resigns his commission on account of ill-health, dated April 2, 1915.
- Charles Nyhan (late Lieutenant, 3rd Battalion, The Monmouthshire Regiment) to be Lieutenant, dated April 7, 1915.
- The appointment of Lieutenant Sidney Hughes, which appeared in the *London Gazette* of April 19, 1915, is antedated April 7, 1915.
- Lieutenant-Colonel and Honorary Surgeon-Colonel Charles Downing resigns his commission on account of ill-health, and is granted permission to retain his rank and wear the prescribed uniform, dated April 9, 1915.
- Henry William Lance, M.B., to be Lieutenant, dated April 10, 1915.
- Major Robert W. Forrest, M.B., is placed on Half-pay List on account of ill-health, dated April 11, 1915.
- Lieutenant John S. Hall, M.B., from the 3rd West Riding Field Ambulance, to be Lieutenant, dated April 20, 1915.
- Sidney Hughes to be Lieutenant, dated April 20, 1915.
- Lieutenant John Douglas Staley is dismissed from His Majesty's Service by sentence of a General Court Martial, dated April 20, 1915.
- Richard Timmis Turner, M.D. (late Captain, 7th Battalion, The Cheshire Regiment), to be Captain, dated April 24, 1915.
- Lieutenant Maurice U. Wilson, from the 5th London Field Ambulance, to be Lieutenant, dated April 24, 1915.
- Captain John O. Summerhayes to be Major, dated April 25, 1915.
- Captain Arthur A. Yates, M.D., from 4th Northern General Hospital, to be Captain, dated April 25, 1915.
- Edward Stanley Johnson to be Lieutenant, dated April 25, 1915.
- Lieutenant Louis B. Stringer resigns his commission, dated May 2, 1915.
- Edmund Henri Gonin, M.D., to be Lieutenant, dated May 7, 1915.
- Colonel Edwin Lee, from Assistant-Director of Medical Services, West Riding Division, to be Colonel, dated April 24, 1915.
- Major G. St. C. Thom, M.B., Royal Army Medical Corps, vacates the appointment as Deputy Assistant Director of Medical Services, Lowland Division, dated February 21, 1915.
- Major Alexander M. McIntosh, M.B., from 3rd Lowland Field Ambulance, to be Deputy Assistant Director of Medical Services, Lowland Division, dated February 21, 1915.
- Major Frederick R. Miller, from 3rd London General Hospital, to be Deputy Assistant Director of Medical Services, 2nd London Reserve Division, dated February 22, 1915.
- Supernumerary, for Service with the Officers Training Corps.*—Wynfrid Laurence Henry Duckworth, M.D., to be Lieutenant, for service with the Field Ambulance Section, Cambridge University Contingent, Senior Division, Officers Training Corps, dated April 24, 1915.
- Nursing Service.*—Miss Jessie Hills to be Matron, dated October 16, 1913.
- The following announcement is substituted for that which appeared in the *London Gazette* of February 2, 1915:—
- Miss Tank Davis to be Matron, dated January 22, 1915.

WARRANT OFFICERS, NON-COMMISSIONED OFFICERS, AND MEN.**PROMOTIONS.**

The following promotions, to complete War Establishment, will take effect from the dates specified:—

To be Serjeant-Majors.

No.	Rank and Name	Date	Remarks
11761	Qmr.-Serjt. Walls, F. S.	6.2.15	
15619	„ Preston, E.	„	
14705	„ Muirhead, W. A.	„	
12410	„ Coombs, R. B.	„	
14602	„ Hughes, J.	„	
13027	„ Cantrell, J. B.	„	
16473	„ George, W.	„	
11528	„ Bannister, J.	„	
15808	„ Primer, C.	„	
17568	„ Steele, E.	„	
12582	„ Whiting, J.	21.2.15	
17260	„ Payne, G. W... ..	„	
13892	„ Dixon, H.	„	
18713	„ Ellis, W. H.	„	
11728	„ Jarvis, T. J.	„	
13398	„ Boxshall, H. S.	„	
15670	„ Goodread, F. W.	„	
9957	„ Stroud, J.	„	
11272	„ Holmes, B.	„	
14503	„ Pottinger, G.	„	
17229	„ Hutchen, W.	„	
17933	„ Dean, D. E.	„	
11207	„ Masters, J. H.	„	
11370	„ Loveland, F.	„	
15437	„ Wilkinson, C. A.	„	
12653	„ Morrison, F. C.	1.3.15	
12259	„ Worswick, J.	„	

To be Quartermaster-Serjeants.

18863	Staff-Serjeant	Mulcahy, J.	20.1.15	
With seniority next below No. 15955 Quartermaster-Serjeant H. G. Miller.				
10522	Staff-Serjeant	Holloman, A.	6.2.15	
14050	„	Andrews, W.	„	
15018	„	Davis, A. J.	„	
15983	„	Lister, C. E.	„	
19046	„	Phillips, S. J... ..	„	
12537	„	Molloy, F.	„	
18718	„	Parr, W. A.	„	
14359	„	Thomas, J. G.	„	
18933	„	Thompson, H. L.	„	
6027	„	Hall, A.	21.2.15	
8179	„	Barlow, G.	„	
9088	„	Parnell, C.	„	
8879	„	Wells, W. J.	„	
9695	„	Yeo, F.	„	
11059	„	Dunn, J.	„	
11841	„	Holmes, S. R.	„	
10581	„	Warsop, H.	„	
8791	„	Jewell, V. E.	„	
	„	Pell, A. E.	„	
12129	„	Barnes, S. M.	„	

To be Quartermaster-Serjeants—Continued.

No.	Rank and Name	Date	Remarks
18678	Staff-Serjeant Ellis, L. S.	21.2.15	
18940	" Musgrave, P. H.	"	
12583	" Ebbs, H.	"	
18613	" Grant, C. F.	"	
19664	" Dunn, J. C.	1.3.15	
12926	" Gordon, A. D.	"	
18801	" Wolfe, G. H.	"	
16053	" Gawthorne, S. M.	"	
18415	" Bell, A.	"	

To be Staff-Serjeants.

17244	Serjeant	McArthur, A. F.	6.2.15
14569	"	Littleworth, F.	"
18655	"	Shepley, F.	"
14735	"	Cox, J. A. C.	"
14668	"	Amsden, A.	"
16878	"	McCaig, R.	"
17663	"	Duerden, G.	"
18973	"	Abbott, J. J.	"
12195	"	Joyce, A.	"
12986	"	Alexander, E.	"
17767	"	Kimber, H. G.	21.2.15
16397	"	Mills, W. G.	"
16474	"	Lowery, W.	"
12088	"	Wells, G.	"
16382	"	Medland, J.	"
295	"	Cheer, A. E.	"
18341	"	Nettle, A.	"
11392	"	Conner, E.	"
1831	"	Riley, S. T.	"
16481	"	Bee, W. W.	"
18917	"	Chadwick, H.	"
12428	"	Ferguson, F. J.	"
10191	"	Moore, G. R.	"
17454	"	Allport, C. E.	"
17058	"	Fayter, H.	"
11814	"	Herington, A. E.	1.3.15
14693	"	Kay, F. W.	"
17390	"	Cowx, R.	"
15538	"	Jesson, E. H.	"
16442	"	Lawson, W.	"
7696	"	Collins, S.	"
17726	"	Murphy, C. P.	"
17727	"	Wrigley, A.	"
18332	"	Bevan, B. B.	"
17794	"	Beckett, W. A.	"

To be Serjeants.

15389	Corporal	Dunn, G.	20.1.15	} As being in possession of Army Form C. 344.
With seniority next below No. 12076 Serjeant W. H. C. Ward				
4593	Corporal	Martin, P. G.	20.1.15	
With seniority next below No. 884 Serjeant B. D. Johnstone				
4841	Corporal	Clarke, A. E.	20.1.15	
With seniority next below No. 4728 Serjeant A. James				
6314	Lce.-Serjt.	Glenny, R.	6.2.15	
6339	"	Haynes, T. W.	"	
11777	"	Overton, G. W.	"	
10641	"	Becker, F.	"	

To be Serjeants—Continued.

No.	Rank and Name	Date	Remarks
18772	Lee.-Serjt.	Taylor, H. E... ..	6.2.15
18202	"	Pask, C.	"
17250	"	Hobbes, A.	"
18126	"	Walshe, T. P... ..	"
10626	"	Hubbert, H.	"
12459	"	Poulton, F. G.	"
18934	"	Court, D. D.	"
16022	"	Dawson, J. J... ..	"
11755	"	Paulizky, J.	"
17910	"	Green, W.	"
12862	"	Porter, T.	"
16462	"	Bushman, A. A.	21.2.15
19126	"	Perkins, F. H.	"
19383	"	Johnson, H.	"
19604	"	Pollock, R.	"
19812	"	Barron, F. P... ..	"
2180	"	Rogers, T. W. G.	"
19039	"	Emerson, J. T.	"
19533	"	Pickerden, T... ..	"
10602	Corporal	Wallace, T.	"
12644	"	Hine, F. W.	"
14578	"	Smith, G. B.	"
14810	"	Colville, W. H.	"
11372	"	Green, E. J.	"
11633	"	Glasson, G. D.	"
16810	"	Miller, M. P.	"
12660	"	Hemaley, E.	"
15814	"	Casey, J. J.	"
16069	"	Alderton, A.	"
17128	"	Fuller, F. G.	"
17598	"	Sparks, W.	"
14090	"	Wells, F. W.	1.3.15
10450	"	Fry, T... ..	"
10992	"	Murray, W.	"
11864	"	Brooks, S. W... ..	"
18374	"	Burke, A.	"
18301	"	Molden, C. J.	"
18468	"	Buchanan, W. H.	"
11492	"	Stoner, H. W.	"
19391	"	Walker, G. W.	"
19597	"	Brindle, L.	"
18907	"	Blundell, W. J.	"
19938	"	Wright, A. E... ..	"
743	"	Coles, F. C.	"
521	"	Triebwasser, G. O.	"
17317	"	Reynolds, J. C.	"
18231	"	Barden, J.	"
19279	"	Mars, H. E.	"
18733	"	Mackenzie, A.	"
1501	"	Thompson, F.	"
1584	"	Phillips, W. E.	"
4727	"	Conway, J. T.	"
18494	"	Major, J. L.	"
1827	"	Spratt, T. F.	"
1875	"	Kitchen, J. E.	"
4973	"	Tunnicliffe, T. A.	"
5906	"	Fagg, C. G.	"
1440	"	Johnston, G.	"
6451	"	Cocks, G. A.	"

To be Corporals.

No.	Rank and Name		Date	Remarks
4999	Private	Bridson, A. R. ..	6.2.15	
6026	"	Lynch, F. ..	"	
6041	"	Vine, W. A. G. ..	"	
6049	"	Herad, E. J. ..	"	
6106	"	Martin, W. G. ..	"	
6125	"	Sage, A. J. ..	"	
6138	"	Hewett, H. ..	"	
6164	"	Parfitt, B. N. ..	"	
6214	"	Jordan, T. A. ..	"	
6264	"	Marsh, J. E. ..	"	
6412	"	Smith, A. L. ..	"	
6546	"	Hyde, A. P. ..	"	
6617	"	Goodwin, R. A. ..	"	
6624	"	Paulley, A. ..	"	
6701	"	Yeandle, W. R. ..	"	
18254	"	Wright, A. W. ..	21.2.15	
6982	"	Adams, W. G. ..	"	
9503	"	Winter, A. ..	"	
10229	"	Redman, C. ..	"	
10270	"	Holder, T. G. W. ..	"	
10281	"	Bartholomew, F. E. ..	"	
10768	"	Lake, B. P. ..	"	
11253	"	Sheehan, J. ..	"	
12081	"	Gunter, H. ..	"	
12290	"	Woods, H. ..	"	
12556	"	Rayner, W. ..	"	
12656	"	McKeown, J. ..	"	
12706	"	Jeffrey, A. J. ..	"	
12790	"	Unwin, L. P. ..	"	
12796	"	Atkinson, R. ..	"	
13059	"	Purvis, J. B. ..	"	
13178	"	Jolley, A. ..	"	
14019	"	Tew, W. H. ..	"	
14077	"	Harris, T. M. ..	"	
14297	"	Bunce, W. H. ..	"	
14555	"	Liddle, E. H. ..	"	
16025	"	Shepherd, A. ..	"	
16429	"	Henley, W. ..	1.3.15	
16976	"	Hall, H. ..	"	
17043	"	Walker, W. A. ..	"	
18520	"	Hill, W. L. ..	"	
18693	"	Williams, R. ..	"	
19271	"	Dale, A. W. ..	"	
19467	"	Hay, C. M. ..	"	
19601	"	Miller, S. ..	"	
19609	"	Aldridge, G. J. ..	"	
19780	"	Pimlott, T. H. ..	"	
19844	"	Green, J. ..	"	
19850	"	Higgins, T. ..	"	
19871	"	Brash, R. H. ..	"	
495	"	McFarland, W. ..	"	
749	"	Evans, J. ..	"	
1362	"	Powell, E. A. ..	"	
1581	"	Horn, W. R. ..	"	
1930	"	Burden, F. ..	"	
2263	"	Gillham, H. J. C. ..	"	
4306	"	Cartledge, J. J. ..	"	
4427	"	Richards, A. H. ..	"	
5433	"	Brouard, H. ..	"	
5613	"	Bates, H. ..	"	

To be Corporals—Continued.

No.	Rank and Name		Date	Remarks
5766	Private	Stacey, G. A. ..	1.3.15	
6185	"	Munday, A. E. ..	"	
6482	"	Barnfield, E. T. ..	"	
6726	"	Salter, W. S. ..	"	
7042	"	Filler, J. J. ..	"	
2511	"	Webb, J. ..	"	
8156	"	Davies, T. ..	"	
3158	"	Steele, L. ..	"	
3195	"	Martin, C. ..	"	
3241	"	McLaughlin, J. ..	"	
3775	"	Sullivan, J. ..	"	
3777	"	Johns, C. ..	"	
3781	"	Wyatt, H. ..	"	
3795	"	Morrison, J. ..	"	

APPOINTMENTS.

The following appointments, to complete War Establishment, will take effect from the date specified :—

To be Lance-Sergeants.

No.	Rank and Name		Date	Remarks
11732	Corporal	Hattam, H. S. ..	1.3.15	
14662	"	Taylor, C. E. ..	"	
18128	"	Marr, J. T. ..	"	
18805	"	Charlton, W. ..	"	
19234	"	Thurgar, E. ..	"	
12278	"	Male, G. H. ..	"	
6714	"	Barnard, D. ..	"	
11698	"	Twomey, J. ..	"	
2031	"	Huppler, N. ..	"	
18838	"	Crock, R. ..	"	
5562	"	Caseley, A. C. J. ..	"	

These appointments and promotions are subject to the conditions laid down in paragraph 85, Standing Orders R.A.M.C., 1914.

To be Corporals.

No.	Rank and Name		Date	Remarks
11347	Private	Holroyd, F. J. ..	1.2.15	} In accordance with Corps Orders No. 6 of this date.
14741	"	Mills, R. H. ..	"	
4439	"	Mathews, W. J. ..	"	
4570	"	Marshall, F. ..	"	
8550	"	Hallamore, H. ..	"	
8637	"	Ranger, H. J. ...	"	
8869	"	Lucas, A. H. ..	"	

AMENDMENT—CORPS ORDERS.

In Corps Order No. 2, dated January 25, 1915, in the list of Promotions to the rank of Corporal, the Corps Number shown against the name of Private Burr, T. E., should read "1830" and not "1930."

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.

The undermentioned non-commissioned officers and men have been selected for admission into Q.A.I.M.N.S. with increased pay at sixpence (6d.) a day, in accordance with Article 861, Royal Warrant for Pay, from the dates specified :—

No.	Rank and Name		Date	Remarks
18621	Serjeant	Walton, A. J. . . .	6.6.14	Vice Serjeant W. Ross, supernumerary.
218	"	Dale, L. A. . . .	"	" Serjeant A. A. Sims, supernumerary.
73	"	Ellard, F. . . .	16.7.14	" Private A. Smith, discharged.
19652	"	Jefford, C. V. . . .	3.8.14	" Staff-Serjt. W. H. Parr, promoted.
45	"	Moffatt, T. J. . . .	10.8.14	" Staff-Serjt. F. G. W. Barnes, promoted.
19161	"	Parkinson, G. . . .	"	" Staff-Serjt. H. J. Ford, promoted.
105	"	Newman, F. . . .	"	" Staff-Serjt. E. J. Barnes, promoted.
19792	"	Baigent, H. A. . . .	"	" Staff-Sjt. P. H. Musgrave, promoted.
17421	"	Plume, P. . . .	"	" Staff-Sjt. E. G. Robinson, promoted.
113	"	Powell, J. D. . . .	"	" Staff-Sjt. M. Ward, promoted.
19884	"	Hort, F. E. . . .	"	" Staff-Sjt. S. M. Gawthorne, promoted.
968	"	Fairweather, R. E. . .	20.8.14	" Staff-Serjt. A. J. Canty, promoted.
19079	Corporal	Stoneham, E. G. . . .	"	" Staff-Serjt. F. C. Bovey, promoted.
193	Serjeant	Truscott, H. P. . . .	"	" Staff-Sjt. G. Prince, promoted.
18737	"	Stovold, W. T. . . .	12.10.14	" Staff-Sjt. C. Vickers, promoted.
19272	"	Lee, W. J. . . .	"	" Staff-Serjt. H. C. A. Lunn, promoted.
19023	"	Tarbet, A. . . .	"	" Staff-Serjt. A. S. Willis, promoted.
19427	"	Vidler, C. E. . . .	12.12.14	" Staff-Serjt. N. W. Brown, promoted.
118	"	Rogers, A. C. . . .	"	" Staff-Serjt. I. Higgins, promoted.
19747	"	Hyde, C. H. . . .	"	" Staff-Serjt. F. H. Jones, promoted.

AWARD OF ARMY FORM C. 344.

The undermentioned have been awarded A.F. C. 344, on completion of three years' training, in accordance with Paragraph 330 Standing Orders, on the dates specified :—

No.	Rank and Name		Date	No.	Rank and Name		Date
19427	Corpl.	Vidler, C. E. . . .	6.9.10	12676	Serjt.	Young, E. A. . . .	2.7.14
19110	"	Smith, C. H. . . .	4.1.11	1620	"	Pegg, A. E. . . .	24.7.14
5260	"	Bew, A. J. . . .	31.12.13	17844	"	Cleushaw, W. A. . .	30.7.14
1985	Private	Brown, R. H. . . .	24.6.14	18385	"	Coupland, F. W. . .	6.8.14
13032	Serjt.	Kerr, T. . . .	30.6.14	1342	"	Davis, H. . . .	20.8.14
4841	Corpl.	Clarke, A. C. . . .	1.7.14	186	Corpl.	Froam, W. G. . . .	13.1.15

ARMY FORM C 344.

The following is a list of successful candidates at the examination for A. F. C. 344, Certificate of Training as a Nurse, held in May, 1914, dated January 13, 1915.

No.	Rank and Name		Station	Per-centage	Order of merit as regards marks awarded
17831	Staff-Serjt.	Gray, A. ..	South Africa ..	0.91	1
14326	"	Morman, W. P. S. ..	Connaught Hospital ..	0.89	2
5565	Serjeant	Day, W. R. ..	London ..	0.88	3
5821	Corporal	Boffin, C. J. ..	Devonport ..	0.87	4
17730	Staff-Serjt.	Wills, P. ..	" ..	0.86	5
1305	Serjeant	Prince, H. M. ..	Cambridge Hospital ..	0.84	6
6264	Private	Marsh, J. E. ..	Chatham ..	0.84	7
5562	Corporal	Caseley, A. C. J. ..	Cork ..	0.83	8
5425	Private	Smith, W. F. ..	Malta ..	0.83	9
5229	"	Langman, B. H. ..	Cambridge Hospital ..	0.81	10
18613	Staff-Serjt.	Grant, C. F. ..	Malta ..	0.81	
5728	Corporal	Biltcliffe, T. ..	Devonport ..	0.81	11
6217	"	Schoenthal, C. ..	Egypt ..	0.81	12
4870	"	Poules, S. ..	Gibraltar ..	0.81	
5796	"	Dixon, W. V. ..	Egypt ..	0.80	13
4368	"	Hardy, C. ..	Gibraltar ..	0.79	14
4882	Serjeant	Summers, F. G. ..	Hong Kong..	0.79	
6233	Corporal	Green, G. L. ..	London ..	0.79	15
5650	Private	Harrott, F. W. ..	Malta ..	0.79	
4936	Corporal	Strange, H. E. ..	Hong Kong..	0.79	16
6257	Private	Wadham, C. T. H. ..	Tidworth ..	0.78	
5577	Corporal	Hilton, R. ..	York ..	0.78	17
18988	Serjeant	Haigh, R. H. T. ..	Cambridge Hospital ..	0.77	18
1073	Corporal	Elliott, W. ..	Hong Kong..	0.77	19
5500	Private	Butler, W. ..	Cambridge Hospital ..	0.77	20
2150	Corporal	Fraser, E. G. ..	South Africa ..	0.77	
5108	"	Westwood, C. ..	Malta ..	0.76	21
5901	"	Johnson, J. E. ..	Curragh ..	0.75	22
1797	Private	Mudge, W. ..	Gibraltar ..	0.75	23
6453	"	Sawyer, E. W. ..	Cambridge Hospital ..	0.74	24
6097	"	Portsmouth, E. L. ..	Netley ..	0.73	25
6284	"	Harris, W. ..	York ..	0.73	26
15698	Staff-Serjt.	Collier, H. C. F. ..	Edinburgh ..	0.73	27
6218	Corporal	Cockerell, A. W. ..	Cambridge Hospital ..	0.73	
6507	Private	Robinson, F. ..	York ..	0.73	28
5679	Corporal	Couzens, W. N. S. ..	London ..	0.73	
4904	Private	Lawson, J. ..	Malta ..	0.73	29
4379	"	Dunn, J. F. ..	" ..	0.73	30
5082	"	Kelly, J. ..	Gibraltar ..	0.73	
19223	Serjeant	Stafford, J. H. ..	Netley ..	0.72	31
5911	Corporal	Howard, H. J. ..	Egypt ..	0.72	32
1569	Serjeant	Farmer, G. L. ..	Connaught Hospital ..	0.72	33
186	Corporal	Fream, W. G. ..	South Africa ..	0.72	
4946	Serjeant	Hastings, A. ..	" ..	0.72	34
5866	Private	Toms, F. H. ..	Shorncliffe ..	0.72	
6341	"	Morley, J. L. ..	Tidworth ..	0.72	35
18324	Staff-Serjt.	Parker, D. ..	Egypt ..	0.72	
1359	Serjeant	Collier, W. N. ..	Cambridge Hospital ..	0.72	36
5630	Private	Ely, T. O. ..	York ..	0.71	37
18251	Serjeant	Ovenden, E. E. ..	Hong Kong..	0.71	
1270	Corporal	Marrable, F. G. ..	Shorncliffe ..	0.71	38
5106	Private	Clarke, A. E. ..	Hong Kong..	0.70	39

List of Successful Candidates—continued.

No.	Rank and Name		Station	Per-centage	Order of merit as regards marks awarded
5097	Private	Woodfield, J. H.	Gibraltar	0.70	40
5747	Corporal	Cotter, D. C.	London	0.70	41
12651	Staff-Serjt.	Bennett, R. H.	Egypt	0.69	42
5621	Private	George, H. J.	Netley	0.69	} 43
5578	"	Bannom, J.	Woolwich	0.69	
6103	Corporal	Allen, W. G.	Shorncliffe	0.69	44
5450	Private	Tapp, W. J.	"	0.68	45
5391	Corporal	Tait, D. C.	Edinburgh	0.67	46
5865	Private	Sewell, B.	Woolwich	0.67	} 47
5881	"	Moth, J. C.	London	0.67	
5200	"	Breeze, J. H.	Gibraltar	0.67	48
5553	"	Sartin, H. F.	Ourragh	0.66	} 49
5751	"	Gowne, C. E. A.	Shorncliffe	0.66	
4824	"	Burnell, W. D.	Egypt	0.66	50
5995	"	Barsby, A. B.	Cork	0.66	} 51
5048	"	Suter, J. W. P.	Gibraltar	0.66	
6402	"	Walters, A. J.	Cambridge Hospital	0.65	52
6241	"	Beeching, A. H.	Chatham	0.65	53
1363	"	Green, H.	South Africa	0.65	54
6185	"	King, S. G.	Cambridge Hospital	0.65	55
19469	Serjeant	Purnell, H. D.	Shorncliffe	0.64	} 56
1383	Private	Rouse, J.	South Africa	0.64	
15484	Staff-Serjt.	Jones, C.	"	0.63	57
6369	Private	Tappolet, E.	Shorncliffe	0.62	58

NURSING SECTION.

The following appointments to the Nursing Section of the Corps will take effect from the dates specified :—

No.	Rank and Name	Date	Remarks
6994	Private	Walker, H. McK. ..	25.3.14
7159	"	Rowley, J. E.	2.7.14
7321	"	Jackson, W.	"
6985	"	Simmons, R.	4.7.14
7364	"	Feenan, P.	11.7.14
7379	"	Brown, A.	"
7707	"	Sheppard, E. E. ..	13.7.14
7708	"	Earl, A. A.	"
7798	"	Dreselman, A.	"
7448	"	Anderson, J. H. ..	18.7.14
5803	"	Tilbury, A. J. ...	20.7.14
7400	"	Boura, J.	"
1843	Corporal	Mack, C. A.	25.7.14
2147	"	Hampson, W. C. ..	"
7232	Private	Boughton, C. E. ..	"
7326	"	Mercer, A. J.	"
7285	"	Trinder, W. T. ..	5.8.14
7287	"	Winder, R.	"

Nursing Section—continued,

No.	Rank and Name		Date	Remarks
7814	Private	Mills, R. C.	5.8.14	Re-appointed.
1889	"	Wilkes, J. T.	6.8.14	
7246	"	Hickey, T.	8.8.14	
7259	"	Feehally, P. A.	"	
7262	"	Thorncroft, P. A.	"	
7408	"	Whitney, H.	"	
16925	"	Cochrane, W.	28.9.14	
137	"	Hirtwhistle, R.	"	
903	"	Hicks, F.	"	
1158	"	Livesey, S.	"	
4751	"	Hart, P.	"	} Supernumerary.
6318	"	Addison, G.	"	
6780	"	Harrison, C.	"	
5171	Serjeant	Eason, W. E. I.	7.10.14	
4351	Private	Gibson, H. W.	"	
15017	"	Coe, C.	19.10.14	
18774	"	Baker, J.	"	
19407	"	Waller, J.	"	
19412	"	Pegler, J.	"	
151	"	Dashfield, G. A. T.	"	Re-appointed.
362	"	Burns, H.	"	
424	"	Bland, W. H.	"	
971	"	Taylor, J. R. H.	"	
1717	"	Emment, H.	"	
1976	"	Jones, A. W.	"	
4897	"	Gospell, E.	"	
5729	"	Witts, L.	"	
7451	"	Bright, W. N.	"	
15490	"	Breeford, C. E.	28.10.14	Re-appointed.
16317	"	Davenport, S.	"	
19092	"	Burton, L. W.	"	
19642	"	Dale, J. C.	"	
19754	"	Dove, P. J.	"	
1333	"	Thomas, W. A.	"	
1631	"	Steadman, F. G.	"	
6522	"	Gale, S.	"	
7295	"	Proud, E. E.	"	
17103	"	Linn, A.	13.12.14	Re-appointed.
884	"	Crutch, J.	23.12.14	
965	"	Tear, E. S.	"	
1179	"	Collard, F. H.	"	
1313	"	Wigley, J.	"	
3774	"	Badcock, E.	"	
3777	"	Johns, C.	"	
3788	"	Godley, F.	"	
3789	"	Balcham, C.	"	
7549	"	Wilkin, R. B.	"	(S.R., Cat. "B.")
7577	"	Howie, J.	"	
7686	"	Hasell, T.	"	
20562	"	Hall, G. E.	"	
702	"	Player, A. J.	29.12.14	
8434	"	Booth, H.	"	
2498	"	Leeks, W.	5.1.15	
6680	"	Hearne, P.	"	
4886	"	Brown, P.	19.1.15	
6198	"	Martin, J.	"	
5926	Serjeant	Dermody, R. J.	8.2.15	

ADVANCEMENT OF ORDERLIES (CORPS PAY).

The following advancements in rate of Corps Pay will take effect from January 1, 1915:—

TO BE ADVANCED TO THE THIRD RATE (AT 8D.).

As Orderlies.

No.	Name	No.	Name	No.	Name
12517	Stradling, J.	5057	Carter, T. D.	6333	Giles, T. F.
15480	Bruford, C. E.	5214	Stanford, E. R.	6341	Morley, J. L.
17277	Knowles, R. N.	5621	George, H. J.	6332	Whiting, F. C.
18520	Hill, W. L.	5704	McCall, J.	6362	Ballard, T. H.
19138	Godfrey, G. P.	5882	Bray, C.	6365	Poulton, W. S.
19669	Joyce, T.	5947	Burt, G. P.	6369	Tappolet, E.
972	Cox, S.	6004	Brewer, T. A.	6462	Walters, A. J.
1831	McVey, J.	6097	Portsmouth, E. L.	6453	Sawyer, E. W.
2234	Macdonald, A.	6152	Carroll, A.		Bernard, F.
2255	Pool, L. F.	6192	Creasdale, F.	6304	Langlois, W.
4402	Hinchcliffe, G. W.	6269	Gould, E.	6507	Robinson, F.
5022	McKeon, M.				

As Clerks.

19268	Kersey, J. B.	2192	Hayes, E. J. A. J.	5824	Potter, G. A.
5952	Rendell, C. E.				

As Superintending Cooks.

11016	Davies, G.	2091	Elwood, T. W.		
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TO BE ADVANCED TO THE FOURTH RATE (AT 6D.).

As Orderlies.

16925	Cochrane, W.	1976	Jones, A. W.	6686	Asplin, G. E.
18774	Baker, J.	2219	Porter, W.	6700	Elliot, A.
18804	Wood, C. J.	4897	Gospell, E.	6726	Salter, W. S.
19072	Collins, L.	5365	Coombs, E.	6730	Harrison, C.
19092	Burton, L. W.	5700	Page, J. W.	6746	Wilson, G.
19311	Cantello, H. J.	5729	Witts, L.	6774	Quinlisk, T.
19407	Waller, J.	6208	Sage, J. W.	6826	Morgan, A. W.
19421	Pegler, J.	6318	Addison, G.	6840	Steedman, W.
19642	Dale, J. C.	6332	Parker, G. H.	6884	Griffin, J.
19754	Dove, P. J.	6390	Wyatt, P.	6935	Beavers, E.
74	Pengilly, W.	6485	Barnfield, E. T.	6970	Small, W. G.
303	Hicks, F.	6527	Tobias, A. R.	6990	Montague, H.
362	Burns, H.	6566	Mackenzie, J. M.	7127	Stocks, C.
424	Bland, W. H.	6604	Tattersfield, G. V.	7170	Riddle, E. C.
702	Player, A. J.	6612	Young, G.	7451	Bright, W. N.
971	Taylor, J. R. H.	6652	Notson, C. A.	7549	Wilkin, R. B.
1158	Livesey, S.	6637	Vann, H. W.	7577	Howie, J.
1607	Pond, W. T.	6680	Hearne, S.	7686	Hasell, T.
1717	Emment, H.				

As Clerks.

387	Bailey, F.	5170	Knott, H.	6742	Crane, A. H.
	Freeland, E.	5251	Campbell, N.	6929	Tait, R. D.
1251	Sweeting, W. T. M.	5894	Jeffrey, H.	7085	Goodall, H. G.
1404	Bawden, C. B.	6201	Young, J. J.	7126	Leitch, J.
1602	Ings, H. M.	6475	Bonham, W. H.	7161	Price, J. W.
2610	Kent, A.	6565	Hobbs, H.	7268	Hall, H. L.
3259	Smith, C. H.	6608	Wilce, S. G.	7742	Burdett, G.

As Cooks.

No.	Name	No.	Name	No.	Name
4551	Cook, W. A.	5782	Clarke, W.	7108	Berry, J. D.
5470	Goreham, W. A.	6889	Cumbley, E.	7323	Cox, F. R.
5492	Shorey, H.	7073	Rogers, P. T.	7337	Tullett, A. J.

BUGLERS.

The following Boys are appointed Buglers from the dates specified :—

No.	Name	Date	No.	Name	Date
7791	Buckmaster, L. ..	18.12.14	8266	Filmer, F. E. ..	28.1.15
7859	Vickers, J. H. ..	18.12.14	10075	Rose, F. C. ..	28.1.15
8027	Slater, N. ..	18.12.14	10077	Green, C. H. W. ..	28.1.15
8412	Miller, R. G. S. ..	18.12.14	10082	Matthews, W. ..	28.1.15
10078	Ford, J. F. ..	18.12.14	9185	Webberley, P. A. P. ..	31.1.15
10081	Welsh, J. ..	18.12.14			

PROMOTION CANCELLED.

The promotion of No. 4582 Private R. J. Ward to the rank of Corporal, published in Corps Order of January 25, 1915, is hereby cancelled.

RE-POSTING TO CORPS.

The undermentioned Non-commissioned Officers rejoined the Corps on the dates specified :—

No.	Rank and Name	Date	Remarks
19253	Staff-Serjt. Wilson, C.	6.2.15	} From Territorial Force.
14706	" Cairns, J.	"	
11059	" Dunn, J.	7.2.15	
11841	" Holmes, S. R.	"	
8791	" Jewell, V. E.	"	
6914	" Darroch, P.	"	
8879	" Wells, W. J.	"	
9695	" Yeo, F.	"	
17521	" Parsons, H. G.	"	
8179	" Barlow, G.	"	
9088	" Parnell, C.	"	
10581	" Warsop, H.	"	
11396	" Pell, A. E.	"	
6029	" Hall, A.	"	

AMENDMENT—CORPS ORDERS.

In Corps Order dated February 8, 1915, the Corps Number of Private J. O. Berry should read "7101" and not "7103," and his initials are as now shown.

PROMOTION CANCELLED.

The promotion to the rank of Corporal published in Corps Order of December 12, 1914, and to the rank of Serjeant in Corps Order of January 25, 1915, of No. 7902 G. Smythe, is hereby cancelled.

NOTES FROM SIMLA.—Colonel E. Eckersley, Assistant Director of Medical Services (B.S.) writes as follows, dated Simla, April 21, 1915 :—

" *Appointments.*—Colonel S. C. Philson is appointed Assistant Director of Medical Services, 8th (Lucknow) Division.

"Lieutenant-Colonel H. E. Winter, R.A.M.C., is appointed temporarily as Assistant Director of Medical Services, Allahabad, and Fyzabad Brigades.

"Colonel W. T. Mould is appointed Assistant Director of Medical Services, Presidency Brigade.

"Major F. A. H. Clarke is appointed Deputy Assistant Director of Medical Services (Sanitary) 5th (Mhow) Division.

"Captain D. Reynolds is appointed Deputy Assistant Director of Medical Services (Mobilization) 5th (Mhow) Division.

"The following officers have been appointed to command the Station Hospitals noted against their names:—

"Lieutenant-Colonel C. F. Wanhill, Station Hospital, Poona.

"Lieutenant-Colonel H. G. F. Stallard, Station Hospital, Colaba.

"Lieutenant-Colonel W. B. Winkfield, Station Hospital, Murree.

"Lieutenant-Colonel F. Ashe, Station Hospital, Agra.

"Major L. L. G. Thorpe, Station Hospital, Ranikhet.

"*Re-employment*.—Lieutenant-Colonel S. J. Rennie (R.L.) has been re-employed and ordered to assume command of Station Hospital, Chakrata.

"*Specialists*.—The following officers have been appointed specialists in the subjects noted against their names:—

"Major A. H. Hayes, Prevention of Disease, 3rd (Lahore) Divisional Area.

"Captain J. M. Elliott, Dermatology, 2nd (Rawalpindi) Division.

"Captain F. B. Jefferiss, Advanced Operative Surgery, 5th (Mhow) Division.

"*Transfers*.—The following transfers have been ordered:—

"Lieutenant-Colonel C. F. Wanhill from the 5th Division to the 6th (Poona) Divisional Area.

"Lieutenant-Colonel H. G. F. Stallard, from the 5th (Mhow) Division to the 6th (Poona) Divisional Area.

"Lieutenant-Colonel W. B. Winkfield, from the Burma to the 2nd (Rawalpindi) Division.

"Lieutenant-Colonel F. Ashe from the 9th (Secunderabad) Division to the 7th (Meerut) Divisional Area.

"Major L. L. G. Thorpe from the 9th (Secunderabad) Division to the 7th (Meerut) Divisional Area.

"Captain L. Murphy from the 9th (Secunderabad) Division to the 4th (Quetta) Division."

ROYAL ARMY MEDICAL CORPS FUND.

THE Annual General Meeting will be held on Monday, June 14, 1915, at 2.30 p.m., in the Library at the Royal Army Medical College, Grosvenor Road, S.W.

F. W. H. DAVIE HARRIS, *Lieut.-Colonel,*
Secretary.

ROYAL ARMY MEDICAL CORPS OFFICERS' BENEVOLENT SOCIETY.

THE Annual General Meeting will be held on Monday, June 14, 1915, at 3 p.m., in the Library at the Royal Army Medical College, Grosvenor Road, S.W.

F. W. H. DAVIE HARRIS, *Lieut.-Colonel,*
Secretary.

ACTION IN THE PERSIAN GULF.

Telegram dated April 18, 1915.

From the General Officer Commanding, Force "D," Basrah.
To the Commander-in-Chief in India, Simla.

I AM delighted to inform Your Excellency that I have received from all quarters glowing accounts of the conduct of the Medical Officers, Assistant Surgeons, Sub-Assistant Surgeons and Army Bearer personnel of the Shaiba force and of the L. of C. In action they displayed great bravery, while throughout the strenuous and unremitting labour of the last six days and nights, their devotion to duty has evoked universal

praise. Over 1,100 wounded, including those of enemy, have been attended to and evacuated to the General Hospital at the Base under conditions of unusual difficulty and strain on the medical personnel, who have nobly done their duty.

DRAFT CIRCULAR BY D.M.S. ARMY HEADQUARTERS, INDIA.

It is with very great pleasure that I forward for information a copy of a telegram received by His Excellency the Commander-in-Chief from the General Officer Commanding-in-Chief Force "D" regarding the courage and devotion to duty displayed by all ranks of the Medical Services in the recent severe fighting near Busra. It is with equal satisfaction I add that His Excellency in acknowledging this telegram expressed his pleasure in learning of the excellent work done and asked that an expression of his high appreciation should be conveyed to all concerned.

I know from what I saw in Egypt and from the many letters I have received from officers serving with other Forces overseas, that the same courage and devotion to duty is displayed everywhere. It will be remembered that Field-Marshal Sir John French communicated to His Excellency The Viceroy a message from General Sir James Willcocks, commending the work of the Field Ambulances, and I am sure that every one will be glad to learn that during the recent great battle at Neuve Chapelle the Field Ambulances carried out their duties under the heaviest fire with untiring zeal, the utmost coolness, and the same intrepidity that distinguished their comrades in the Persian Gulf.

OPERATIONS IN CONNEXION WITH THE MUTINY AT SINGAPORE.

R.A.M.C.'S COURAGEOUS WORK.

EXTRACT from the Governor's address to the troops on April 10, 1915.

"But there is one department to which I have not referred, and that is the Royal Army Medical Corps. The officers and men of that department have nobly upheld the traditions of the department. As an instance, I will recall shortly the action of Staff-Serjeant Vickers. On the afternoon of February 15 he was in charge of the Military Medical Hospital at Tanglin. The first he knew of the mutiny was hearing some shots, and finding himself in his office being fired at. He immediately went to the telephone, still under fire, but found he could not get on to the exchange. He then went out, still under fire, and reached Dr. Martin's bungalow, about 300 yards off. Dr. Martin was not at home, but he used the telephone and got on to Fort Canning, the police, and also Dr. Fowlie, who without a moment's hesitation, and without a thought of the risk to himself, went to Tanglin Barracks. Then Staff-Serjeant Vickers, having done this, considered it his duty to go back to his patients and to look after the wounded. I think this is a record of devotion to duty and calm courage without the excitement of having a rifle in your hand and being able to shoot, and this behaviour of Staff-Serjeant Vickers stands prominently forward."

OBITUARY.

MAJOR F. G. RICHARDS.

THE following account of the work of Major F. G. Richards, and how he met his death, was written by the Rev. O. S. Watkins, Chaplain to the Forces, and appeared in the *Kingswood Magazine* for April, 1915:—

AN OFFICER AND A GENTLEMAN.

The popular hero at the present moment is the man in khaki, and rightly so, for he is enduring unheard-of hardships, and facing death in some of its most horrible forms, in defence of King and Country. But it is not only the fighting virtues that call for our admiration, nor the fighting man alone who is worthy of our regard. There are those who wear the King's uniform who are just as brave, and yet who never fire a shot or strike a blow. I want to tell you of one of these—a man who might well be taken as the model on which you should mould your lives and characters—brave, God-fearing, devoted to duty—a very gentle Christian knight. I am afraid it is beyond my powers to bring you to know him as I did, and it is the more difficult in that I write under the shadow of his loss, for only three weeks have passed since we laid him to rest in the little churchyard of the Belgian village of Neuve Eglise.

Major F. G. Richards joined the Royal Army Medical Corps during the South African War, and it was then that I first met him. In those days I did not know him intimately, for we were serving in different units, though in the same Division, and both took part in the operations which resulted in the outflanking of Laing's Nek and Majuba. But even that slight acquaintance made an impression, and when I joined the 14th Field Ambulance on mobilization last August it was with genuine pleasure that I learned that he also was to serve with the same unit. In the months that followed we came to know each other as only men can who live in the close intimacy of bivouac or crowded billet, are companions on the march, and share together such experiences as the retreat from Mons, the battles of the Aisne and Marne, and the even worse fighting in Flanders. My whole ministry has been spent amongst brave men—I never met a braver or a more unselfish man than Richards.

During the famous "fighting retreat," he was always cheerful, undismayed, and, where all did well, by common consent it was agreed that he went "one better." During the battle of the Marne he did some of the finest work I have ever seen done by the Royal Army Medical Corps, and that is saying a great deal. On the second day of that great fight I was with him most of the time, and I shall never forget the calmness—almost indifference it seemed—with which he climbed the hill above Pissaloup, walking into what was the most deadly rifle fire any of us had yet seen. "You stay here, Padre, with the bearers. There's no sense in uselessly risking men's lives. I'll go and see if the conditions are such that it is possible to bring the wounded out of the wood." I hardly expected to see him again, but shortly he was back, bringing wounded carried by regimental stretcher-bearers, and all he said was, "It's not very healthy up there, Padre, and there's plenty for you to do here. I wouldn't go if I were you, you're more use here." How he worked at those cross-roads on the edge of the wood! With what skill and tenderness he bound up the ghastly hurts; and when the injury was beyond all hope, his eyes would hold mine for a moment with a look which said, "What's left to do is your task, Padre." The shrapnel was beating like rain on the opposite side of the road, the position was fast becoming untenable as a collecting point, and so the scores of wounded had to be carried to a safer place. There was no sign of haste or flurry as he gave his orders and helped in the work. Men looking at him, and hearing his quiet orders and level voice, would never have dreamed that there was any peril, or that their leader hardly expected to bring them out of it alive.

During the long drawn out fight on the banks of the Aisne his work was even more wonderful. He was in command of the "advance dressing station" of the ambulance, and when the passage of the river was forced, the infantry crossing on rafts, Richards crossed with them, and that night brought wounded out of action under conditions which have earned the V.C. before now. During the subsequent days, though suffering with a septic foot on which he could not wear a boot, he would limp across those open fields which lay between the river and St. Margaret's, in full view of the enemy's guns and constantly swept by shrapnel, in order to discover what wounded were there, and how many stretcher-bearers would be required, for he never risked more of his bearers' lives than was absolutely necessary. When shells were dropping round his dressing station, and the nerves of others were shaken, he would hardly glance up from the book he was reading, and the mere sight of his calmness gave strength. Small wonder that the men worshipped him, and that amongst the officers of the ambulance there was keen competition to be amongst the chosen ones who served under him at the advanced dressing station. I have known a young officer made happy for days because Richards had acknowledged some gallant act by saying, with approval in his voice, "Stout fellow!"

From the Aisne we were sent in haste to the country round Arras, La Bassée, and Richebourg—days of nightmare horror, when the endurance of our troops had almost reached breaking point, and the casualties poured in on us like a flood. Richards was still in command of the advance dressing station, the trenches could only be reached at night, and even then the task was a dangerous one. But whenever we took up a new position he went over the whole route that his helpers would have to cover, *in daylight*, marking the lie of the land, noting the best road, visiting the regimental aid posts, and deciding just how far it would be safe to bring the ambulance wagons, and which would be the safest line of approach for the bearers. It needed courage of a high quality to travel that road at night, but in broad daylight it was nothing less than heroic. When expostulated with he would say, "Oh, I am all right; I am very careful. If they start firing I take cover until they have finished. Besides, I could not send these young fellows out with the bearers until I had taken every reasonable precaution for their safety." My space will not permit me to tell in detail all he did

during those dreadful days of horror and anxiety, nor of fine service rendered in these recent days in Yprés, and that part of the British front which we are now holding. Suffice it to say that he was "mentioned in dispatches," had he lived he would have received fuller recognition, and even now may be awarded high distinction, though he himself is no longer with us to wear his well-deserved honours.

He died as he had lived, thinking not of himself; and he gave his life for others. The village of Neuve Eglise, in which we were billeted, had long been shelled, but the damage done was trivial, and we had almost ceased to heed it. As we sat chatting after breakfast there was the roar of a sudden explosion, and everybody rushed from the room to see what had happened. Richards rose in his calm, unruffled way, and looking at me said with a smile, "It has come at last, Padre. That was in the dressing station." Together we raced across the garden to the building used as hospital and dressing station—a few moments later a second six-inch high-explosive shell fell on the path down which we passed—and as we entered the building we were met by torn, dazed and bleeding men staggering out of the ruins.

Inside was a scene baffling all description, and horrors I refuse to attempt to describe. The dead we left for the moment, and searched among the debris for the wounded; and having decided that all were removed Richards ordered every man out of the place, "for there will be another shell here in a second or two." As he passed out of the door he met it—there was a deafening roar, a blinding flash, it was as though the whole place had collapsed like a house of cards, dust, bricks, glass, beams, flying in all directions. . . . He was still alive when we reached him, but he knew his call had come. His testimony of faith in God was sublime. His courage and fortitude were just what one would have expected who knew him as I did—and his whole thought was of others. As we laid him in his last resting-place our hearts were very heavy. We felt we should never see his like again; and yet we were glad, for God had permitted us to know one of His own true knights, and our whole lives had been enriched thereby.

OWEN S. WATKINS.

DEATH OF A VETERAN SOLDIER.

ON Wednesday, January 20, there passed away at his home in Pound Street, Bitterne, Hants, aged 95, an old resident and a fine old soldier, Serjeant Robert Patrick Shortell, late Army Hospital Corps. He enlisted in 1844 in the 28th Regiment from his home in Ireland. In 1852 he was transferred to the 86th Regiment, and with that regiment served with the Central India Field Force during the Indian Mutiny, 1857-8. He was present with his regiment at the siege and capture of the fort of Chandaree, March 17, 1858; the siege and capture of the town and fortress of Jhansi; the operations before Calpee and the capture of that town; at the battle of Morar; and at the battle before and capture of Gwalior in June, 1858, all under Sir Hugh Rose, K.C.B.

In 1860 Shortell joined the Army Hospital Corps, and when the Army Medical School was opened at Fort Pitt, Chatham, in October, 1860, he became Orderly to Sir Thomas Longmore, then Deputy-Inspector General of Hospitals, and appointed the first Professor of Military Surgery. Shortell moved with the Army Medical School to Netley in 1863, and was shortly promoted to be Serjeant, with charge—under Sir Thomas Longmore—of the military surgery part of the Museum, chiefly the models of stretchers, ambulance wagons, etc., many of which Shortell made, as he was an excellent turner and mechanic, and a good mathematician.

In 1866 Serjeant Shortell invented a "wheeled stretcher-support on springs," which invention was adapted for wheeling the regulation stretcher of the British Army.

In 1867, on the occasion of the Universal Exhibition at Paris, Serjeant Shortell was sent there on duty connected with the British section. He took his "wheeled stretcher-support" with him, and it was placed among the other articles forming the collection exhibited by the National Societies for Aid to Wounded in time of War.

At the close of the Exhibition Serjeant Shortell received a Silver Medal for his invention from the International Committee representing the societies above mentioned, and a Bronze Medal from the Emperor Napoleon III "for services rendered."

Serjeant Shortell retired from the Service in 1869 with a pension, and had lived ever since at Bitterne, in a house which he built for himself on leaving the Service. He had the Medal and Clasp for the Central India Campaign, and the Medal with Gratuity of £5 for Long Service and Good Conduct.

Serjeant Shortell was laid to rest in Bitterne Churchyard on Monday, January 25,

carried to his grave by men of the Royal Army Medical Corps, his coffin covered with the Union Jack, and the "Last Post" was sounded over his grave. The officers and all ranks of the R.A.M.C. at Netley sent a beautiful wreath to honour the veteran of their Service, who was a good soldier, a clever man, and a faithful friend.

COMFORTS FOR THE MEN OF THE R.A.M.C.

At the beginning of the War Mrs. Claude Morgan, at Aldershot, immediately started a scheme for sending comforts to the R.A.M.C. men of the Expeditionary Force in France. Later a Committee of the wives of surgeons-general was formed in London under Lady Sloggett, wife of the Director-General in France, and Mrs. Morgan was requested to be Secretary in order to carry on at its strongest work so ably begun. Since October, therefore, this Committee has worked unceasingly with a fine band of helpers at the Royal Army Medical College at Grosvenor Road. Here, where one part of the College is still devoted to the tremendous demands of the armies for trained men and scientific material, certain lecture rooms and a few laboratories, where medical officers in ordinary times go through stated courses of study, are at present vacant, and have been handed over to the Committee of the R.A.M.C. Comforts as workrooms. With funds willingly subscribed to by the R.A.M.C. messes, individual officers, and friends, and work untiringly undertaken by the officers' wives, the Committee have the satisfaction of knowing that the men in the field have practically been individually cared for from the start. The trained nursing orderly in the field is exposed to the accidents of war while in the pursuit of his duty under nearly all circumstances. It is not easy to bridge in imagination the time between the moment when a soldier is wounded and when he is finally lying in an English hospital with soft-footed nurses in attendance and a hush in the wards around him. To transport him there men may have given their lives. That nursing orderlies have performed their work devotedly in this War has been acknowledged on all sides. It is for these men, in field ambulances particularly, that the R.A.M.C. ladies have been working. Where full names and addresses are furnished of R.A.M.C. prisoners in Germany the Committee make up parcels for delivery, and have already reached R.A.M.C. men there with much appreciated gifts. To send appropriate comforts is their object—clothing where required, books light in weight for reading during what are called the "stagnant" hours in France, sweets and cakes, towels and soap, notepaper and games, handkerchiefs, shirts, and socks—particularly at the present moment—good shirts and socks. Money to buy the thing most required at the moment is the greatest help to the Committee. With the additions to the Royal Army Medical Corps of recent days, and the large increase of men in the field, the resources of the Committee are being urgently drawn upon. The Committee will be glad to receive material or subscriptions, c/o Mrs. Morgan, R.A.M.C. Comforts, Royal Army Medical College, Grosvenor Road, London, S.W.—*The Sphere*, April 17, 1915.

RUGBY IN THE ARMY.

[Extract from the *Morning Post*.]

A BRILLIANT R.A.M.C. FIFTEEN.

From Our Special Correspondent.

THE H.A.C. and R.A.M.C. match at Richmond played its part excellently well. It meant many well-filled tobacco pouches for our sailors and soldiers; it yielded a stirring display of the best arts in Rugby. Londoners fell in heartily with the idea of supporting the Tobacco Fund Committee; they were able at the same time to enjoy a wholesome sporting spectacle with easy consciences. Naturally, it was more than less a company in khaki that filled the stands and thronged the ring-side, and the eligibles who were present and had delayed taking the plunge must have been moved to patriotism either by the fine music of the H.A.C. Headquarters' Band or by the magnificent Rugby of the men who are impatiently waiting to follow in the footsteps of that hero, Surgeon Huggan. It was said on Saturday of Huggan, by a wounded officer who was with him on that fatal day, that "Johnny won the V.C. over and over again before he was finally laid low. He was playing the game on the field just as he played his Rugby." On Saturday we were frequently reminded of Huggan because of the many brilliant medical contemporaries of his in this R.A.M.C. side from Aldershot—men with whom he had played, for and against.

This medical side certainly played great football in beating the H.A.C. by six tries to nothing. Its members may not have been able to kick goals, but in all other arts of the game they were up at the top of their form. Primarily it was the old story of the dominance of scrummage power. The pack made a striking impression in its scarlet jerseys and light blue stockings as it came sweeping down the field in irresistible foot-rushes. Harry Coverdale and A. K. Horan, the Blackheath halves, with all their genius for the H.A.C., seemed unable to steady their side. With saving kicks or short runs they would drive the medical men back a bit, but on again came the R.A.M.C. scrummagers with the ball at their feet, reaching the three-quarters and full-back before there was any time to get in a kick. Leonard Brown, of Balliol; J. C. Dowse, of Trinity College (Dublin); Lane Roberts, of Guy's; and R. A. MacGrath, of Bective, brought into the work all the fervour of an Irish pack. Right through the piece the manner of the R.A.M.C. reminded us of the Irish Rugby character, and the impression was intensified by seeing those Irish Internationals—Quinn and Minch—doing tremendous work on the three-quarter line. The R.A.M.C., with a following wind, made the pace very fast. The H.A.C. scrummagers could not live against it. They were pushed off the ball; the medical forwards swept on to the half-backs. The wonder was that only three tries were made in the first half. The very impetuosity of such Rugby, however, meant the losing of many chances.

Would the Blackheath half-backs and Pantlin alter things when the sides crossed over? was the natural question asked. But when the R.A.M.C. came to play into the wind the men were as good as ever. The great, burly pack went on with its rushes; L. R. Broster, the Oxford Blue, at the base of the scrummage just revelled in the hard work, and saw that Minch and Quinn had plenty of the ball. The H.A.C. was given no repose to find a game. The tackling was intense. With the wind and the kicking and the elusive work of Coverdale the H.A.C. made a few attacks that merely went to discover the art of Broster and Minch and Quinn. And so there were three more tries; Brown went over in the corner, a Harlequin movement was finished by Quinn's romping over, and finally Dowse put on the sixth try.

It was a great match—a game that appealed to the heart of the old-fashioned Unionist. The stirring forward rushes, the half-back work of Broster on the one side and of Coverdale and Horan on the other, the intense tackling—it was all very real Rugby. Even such a hardened referee as Mr. Howard Tyas found it exacting business to keep in a game of such pace.

THE ARMY MEDICAL OFFICERS' WIDOWS' AND ORPHANS' FUND.

THE One Hundredth Annual General Meeting was held in the Library of the Royal Army Medical College on May 18, 1915.

Present.

Deputy-Surgeon-General W. G. Don, Vice-President, in the Chair.

Surgeon-General Sir Charles McD. Cuffe, K.C.B.

Surgeon-General H. R. Whitehead, C.B.

Sir James R. D. McGrigor.

Colonel J. M. Beamish.

Lieutenants-Colonel A. F. S. Clarke, R. S. H. Fuhr, D.S.O., and J. Stevenson.

The Minutes of the previous Annual General Meeting were confirmed.

The Balance Sheet and Report for the year 1914 were adopted.

Messrs Deloitte, Plender, Griffiths and Co. were appointed Auditors for the year 1915.

Colonel W. H. Horrocks, retiring at the expiration of three years' service on the Committee, was reappointed a member thereof.

The resignation, on account of ill-health, of Lieutenant-Colonel A. F. S. Clarke, one of the Trustees of the Society, was received with much regret, and a vote of thanks to him for his long services to the Society was passed unanimously.

Colonel D. Wardrop, C.V.O., was appointed a trustee in the place of Lieutenant-Colonel A. F. S. Clarke.

The meeting closed with a vote of thanks to the Chair.

3, Homefield Road,
Wimbledon, S. W.

J. T. CLAPHAM, Captain,
Secretary.

ARMY MEDICAL OFFICERS' WIDOWS' AND ORPHANS' FUND.

ACCOUNTS FOR THE YEAR 1914.

(In the form prescribed for the Annual Return of a Registered Friendly Society.)

(A) BENEFIT FUND.

DR.	INCOME.	£	s.	d.	EXPENDITURE.	£	s.	d.
Members' Subscriptions...	..	2,148	17	9	Widows' Annuities ..	..	..	..
Interest on Investments of Benefit Fund (including amounts refunded and recoverable in respect of Income Tax)	5,229	5	1	Interest on £5,582 7s. 3d. (balance of Management Fund at the end of the year 1913) at 3 per cent, transferred to Management Fund ..	..	..	3,948 14 8
Total Income	£7,378	2	10	Total Expenditure ..	..	..	167 9 6
Amount of Benefit Fund at the beginning of the year, as per last Balance Sheet	136,816	3	7	Amount of Benefit Fund at the end of the year, as per Balance Sheet (C) ..	..	..	£4,116 4 2
		£144,194	6	5				140,078 2 3
								£144,194 6 5

(B) MANAGEMENT FUND.

DR.	INCOME.	£	s.	d.	EXPENDITURE.	£	s.	d.
Interest for one year on £5,582 7s. 3d. at 3 per cent, transferred from Benefit Fund	167	9	6	Secretary's Salary ..	..	..	150 0 0
Management Fund at the beginning of the year, as per last Balance Sheet	5,582	7	3	Office Allowance ..	..	..	60 0 0
					Actuary's Fees ..	..	..	10 10 0
					Auditors' Fees ..	..	..	10 10 0
					Printing, Postages, and Stationery ..	..	..	12 13 3
					Total Expenditure ..	..	..	£243 13 3
					Amount of Management Fund at the end of the year, as per Balance Sheet (C) ..	..	..	5,506 3 6
								£5,749 16 9

(C) BALANCE SHEET AT DECEMBER 31, 1914.

DR.	LIABILITIES.		ASSETS.		Rate per cent of		O/b.	
	Benefit Fund, as per Account (A) ..		INVESTMENTS.		Interest yielded		£ s. d.	
Management Fund, as per Account (B)	(1) With the Commissioners for the Re-		£ s. d.		£ s. d.	
Sundry Liabilities—	duction of the National Debt—		3 16 0½		104,588 8 11	
Secretary's Salary and Office Allowance (from	Old Account, at 2½d. per cent. per diem—		3 16 0½		104,588 8 11	
October 1 to December 31, 1914)	(2) In the Public Funds—		..		..
Actuary's Fee	Two and a Half per		..		..
Annuities outstanding	Cent Consols		£4,917 18 10		3 8 9	
			Dominion of Canada		..		3,897 9 8	
			Three and a Half		..		..
			per Cent Stock,		5,500 0 0		3 9 5	
			1930-1950 ..		..		5,547 19 0	
			Newfoundland		..		..
			Three and a Half		2,000 0 0		3 11 9	
			per Cent Stock, 1910		..		1,948 19 0	
			(3) Upon the Security of		..		..
			Borough and County		..		..
			Rates, or other Cor-		..		..
			porate Funds—		..		..
			London County		..		..
			Council Three		..		..
			and a Half per		5,000 0 0		3 9 8	
			Cent Stock ..		..		5,025 8 0	
			Metropolitan Water		..		..
			Board "B" Three		..		..
			per Cent Stock ..		5,000 0 0		3 11 10	
			(4) Other Securities—		..		4,175 6 0	
			Great Western Rail-		..		..
			way Four per Cent		5,000 0 0		3 12 4	
			Debenture Stock		..		5,530 8 0	
			London and North-		..		..
			Western Railway		..		..
			Three per Cent		5,000 0 0		3 10 7	
			Debenture Stock		..		4,250 0 0	
			Caledonian Railway		..		..
			Four per Cent		1,449 0 0		3 14 9	
			Debenture Stock		..		1,550 8 7	
			Midland Railway		..		..
			Two and a Half		7,827 5 7		3 12 6	
			per Cent Deben-		..		5,400 16 5	
			ture Stock ..		..		..
			East Indian Rail-		..		..
			way Three and a		2,060 0 0		3 14 6	
			Half per Cent De-		..		1,936 8 0	
			venture Stock ..		..		..
			Note—A valuation of the above Securities at minimum published		..		..
			prices on Jan. 4, 1915, shows a depreciation of £4,305 10s. 1d.		..		325 0 0	
			Interest accrued on Investments since received ..		..		22 15 0	
			Income Tax recoverable ..		..		3 0 0	
			Subscription outstanding ..		..		1,630 19 7	
			Cash at Bankers ..		..		£145,777 5 9	

To the Members of the Army Medical Officers' Widows' and Orphans' Fund.

We have examined the above Balance Sheet with the Books and Vouchers of the Society and certify that it is in accordance therewith. The Securities and Cash Balances have been verified by us.

DELOITTE, PLENDER, } Auditors,
GRIFFITHS AND CO., }
Chartered Accountants.

5, London Wall Buildings,
Finsbury Circus, E.C.
April 8, 1915.

£145,777 5 9

REPORT FOR THE YEAR 1914.

The Committee have the honour to present the following Report on the affairs of the Society, and to submit the accounts for the year ended December 31, 1914.

At the Annual General Meeting, held in May, 1914, Surgeon-General Sir Arthur Sloggett, Director-General, was elected President of the Society. Vacancies on the Committee were filled by the election of Surgeon-General H. R. Whitehead, Colonels M. P. Holt, T. W. Gibbard (re-elected), and Majors E. T. F. Birrell and R. S. H. Fuhr.

On the outbreak of war the Committee, as empowered by Rule V (amended for this purpose in June, 1911), decided, on the advice of the Actuary, that for the time being no new members should be admitted to the Society except at an extra charge of fifty guineas per annum, in addition to the normal annual subscription according to scale. Further, that in view of the possible large increase of the Corps, admission be limited to officers and probationers on the strength of the Corps at the outbreak of war; the Committee reserving to itself power to close the Society, temporarily, to all new members, should this at any time seem desirable.

During the past year nine new members have been admitted, three have died, and one has resigned. One annuitant has died. Details will be found in the roll of members. In spite of the heavy losses in action of officers of the Corps, Captain C. P. O'Brien-Butler, who died of wounds at Ypres, is the only member of the Society whose death has been reported.

Movement of members	Unmarried members	Married members	Annuitant members	Total
Members on the books, December 31, 1913 ..	14	152	71	237
New members and new annuitants ..	1	8	3	12
Unmarried members who are now married ..	..	..	..	..
Members who have died ..	..	3	1	4
Members who have resigned ..	..	1	..	1
Married members who are now widowers ..	..	..	..	..
Members on the books, December 31, 1914 ..	15	156	73	244

There has been no change in the investments of the Society during the past year. The depreciation in value of Securities has increased since the last Balance Sheet from £3,800 ls. to £4,305 10s. 1d.

The amount of £104,533 8s. 11d., representing the deposit (old account) with the Commissioners for the reduction of the National Debt, is made up as under:—

	£	s.	d.
Balance at December 31, 1913 ..	101,497	11	7
Add interest at £3 16s. 0½d. per cent. per annum ..	3,885	17	4
	105,383	8	11
Deduct:—			
Amount withdrawn on account of payment of annuities ..	850	0	0
Balance as per balance sheet of December 31, 1914 ..	104,533	8	11

In view of the present favourable state of the market the Committee are considering the question of investing otherwise the above money now on deposit with the National Debt Commissioners. Members will remember that the present rate of interest, 3½ per cent, may at any time be reduced by the Commissioners to 3 per cent; and, in any case, will be so reduced after the death of the few remaining annuitants on the Old Account. Most of these ladies are more than 80 years of age.

The Committee have had under consideration the question whether members whose annual subscription exceeds £10 should be allowed the option of paying it by equal half-yearly instalments. This would involve an amendment of the Rules, for which the sanction of a Special General Meeting is necessary. As under existing circumstances it is hardly possible to assemble a representative meeting the Committee are holding the matter over for the present.

Members are reminded that in the event of the death of a member abroad (which is verified at the War Office), the Committee will forward the sum due to the widow by telegraph, should she so request; any extra expense being borne by her.

Royal Army Medical College,
April 22, 1915.

W. G. DON, *Deputy-Surgeon-General*,
Vice-President.

Chairman of the Meeting of this date.

BIRTHS.

O'RORKE.—At Jalapahar, Darjeeling, the wife of Captain C. H. O'Rorke, R.A.M.C., of a daughter, on March 16, 1915.

GIBSON.—At Mahableshwar, India, on March 29, 1915, the wife of Captain H. Gibson, R.A.M.C., of a son.

DEATHS.

RINTOUL.—Killed in action at St. Julien, Ypres, on October 21, 1914, Lieutenant David Wylie Rintoul, M.B., Royal Army Medical Corps.

SUTCLIFF.—On March 12, 1915, at Wittenberg, Germany, of typhus fever, Captain Archibald A. Sutcliff, M.B., R.A.M.C., aged 33.

FRY.—On March 17, 1915, at Wittenberg, Germany, of typhus fever, Major Walter Burgess Fry, R.A.M.C., aged 37.

BURNETT.—Killed in action, at Chaiba, on April 14, 1915, Captain Maurice Burnett, Royal Army Medical Corps, son of Surgeon-General W. F. Burnett, C.B., aged 26.

BRADFORD.—Lieutenant-Colonel Robert Mark Bradford, retired, Army Medical Staff, died at Bradford Peverell, Dorset, on April 22, 1915, aged 68.

McCULLOCH.—Killed in action, near Ypres, on May 2, Lieutenant R. A. D. McCulloch, 1st Battalion, The King's Own, Royal Lancaster Regiment, dearly loved elder son of Lieutenant-Colonel T. McCulloch, R.A.M.C., 6, St. George's Road, Bedford, aged 19.

EXCHANGES, &c.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd., 8, Serle Street, London, W.C., not later than the 22nd of the month.

A free issue of twenty-five reprints will be made to contributors of Original Communications, and of twenty-five excerpts of Lectures, Travels, and Proceedings of the United Services Medical Society.

Any demand for excerpts, additional to the above, or for reprints, must be forwarded at the time of submission of the article for publication, and will be charged for at the following rates, and additional copies at proportionate rates:—

NUMBER OF REPRINTS	NUMBER OF PAGES	COST OF REPRINTS	COST OF EXCERPTS *	EXTRA FOR COVERS FOR REPRINTS			
				As Journal, Printed on Front	As Journal, Plain, Unprinted	Cheaper Paper, Printed on Front	Cheaper Paper, Plain, Unprinted
12	4	£ s. d. 0 2 6	£ s. d. 0 1 0	} 3 6	0 11	3 2	0 7
	8	0 4 6	0 2 0				
	16	0 7 6	0 3 6				
25	4	0 3 0	0 1 3	} 4 0	1 3	3 6	0 9
	8	0 5 6	0 2 6				
	16	0 9 6	0 4 6				
50	4	0 4 0	0 1 8	} 5 0	1 9	4 0	1 0
	8	0 6 9	0 3 2				
	16	0 12 0	0 5 3				
100	4	0 5 6	0 2 9	} 6 6	3 3	5 6	2 0
	8	0 9 0	0 4 4				
	16	0 16 9	0 6 9				
200	4	0 8 6	0 4 0	} 9 0	6 3	7 6	4 0
	8	0 13 6	0 6 0				
	16	1 3 6	0 8 9				

* These are not arranged as Reprints, but appear precisely as in the Journal with any other matter that may happen to appear on the first and last pages of the particular excerpt ordered.

CASES FOR BINDING VOLUMES.—Strong and useful cases for binding can be obtained from the publishers at the undermentioned rates:—

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These charges are exclusive of cost of postage.

In forwarding parts for binding the name and address of sender should be enclosed in parcel.

All Applications for Advertisements to be made to—

G. STREET & CO., LTD., 8, SERLE STREET, LONDON, W.C.

The back outside cover is not available for advertisements.

Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

All such Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the Author notifies at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," War Office, Whitehall, London, S. W.

Communications have been received from Major P. Moxey, Captain G. Scott-Williamson, Serjeant-Major E. B. Dewberry, Major Sir John Bland-Sutton, Captain C. Potts, Major D. Embleton, Captain E. A. Peters, Lieutenant-Colonel W. A. Turner, Colonel C. Birt, Lieutenant-Colonel G. G. Nasmith.

The following publications have been received :—

British : The Lancet, Public Health, St. Bartholomew's Hospital Journal, The Royal Engineers' Journal, Medical Press and Circular, The Medical Journal of Australia, The Medical Review, The Hospital, Annual Report of the Health of Gibraltar (1914), The Practitioner, The Indian Medical Journal, The Sanitary Record and Municipal Engineering, The United Service Institution of India, The Journal of Tropical Medicine and Hygiene.

Foreign : Revista de Sanidad Militar, Bulletin de la Société de Pathologie Exotique, Bulletin de l'Institut Pasteur, Le Caducée, The Military Surgeon, Norsk Tidsskrift for Militærmedicin.

MANAGER'S NOTICES.

The **JOURNAL OF THE ROYAL ARMY MEDICAL CORPS** is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

The Annual Subscription is £1 (which includes postage), and should commence either on 1st July or 1st January; but if a subscriber wishes to commence at any other month he may do so by paying for the odd months between 1st July and 1st January at the rate of 1s. 8d. (one shilling and eightpence) per copy. (All subscriptions are payable in advance.)

Single copies can be obtained at the rate of 2s. per copy.

The Corps News is also issued separately from the Journal, and can be subscribed for at the rate of 2s. (two shillings) per annum, including postage. Subscriptions should commence from 1st July each year; but if intending subscribers wish to commence from any other month, they may do so by paying for the odd months at the rate of 2d. per copy. (All subscriptions are payable in advance.)

Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager, "Journal of the Royal Army Medical Corps," War Office, Whitehall, London, S.W., and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

It is requested that all Cheques or Postal Orders for Subscriptions to the Journal, Corps News, Reprints, etc., be crossed "Holt & Co.," and made payable to the "Hon. Manager, Journal R.A.M.C.," and not to any individual personally.

All communications for the Hon. Manager regarding subscriptions, etc., should be addressed to

THE HON. MANAGER,
"JOURNAL OF THE ROYAL ARMY MEDICAL CORPS,"
WAR OFFICE, WHITEHALL, S.W.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

APRIL AND MAY, 1915.

EXTRACT FROM "LONDON GAZETTE," JUNE 18, 1915.

War Office,
June 22, 1915.

The following dispatch has been received by the Secretary of State for War from the Field-Marshal Commanding-in-Chief, British Forces in the Field:—

"May 31, 1915.

"MY LORD,—In accordance with the last paragraph of my dispatch of April 5, 1915, I have the honour to bring to notice names of those whom I recommend for gallant and distinguished service in the Field.

"I have the honour to be,

"Your Lordship's most obedient servant,

(Signed) "J. D. P. FRENCH,

*"Field-Marshal Commanding-in-Chief
The British Army in the Field."*

GENERAL HEADQUARTERS STAFF, ETC.

Beveridge, Lieut.-Col. W. W. O., D.S.O.,
M.B., R.A.M.C.

Birrell, Lieut.-Col. E. T. F., C.M.G.,
M.B., R.A.M.C.

Brakenridge, Lieut.-Col. F. J., R.A.M.C.

Burtchaell, Col. C. H., C.M.G., M.B.

Carr, Col. H., M.D.

Chopping, Lieut.-Col. A., R.A.M.C.

Cummins, Lieut.-Col. S. L., M.D.,
R.A.M.C.

Davidson, Maj. P., D.S.O., M.B., R.A.M.C.

Dwyer, Capt. P., M.B., R.A.M.C.

Easton, Maj. P. G., R.A.M.C.

Ensor, Lieut.-Col. H., D.S.O., M.B.,
R.A.M.C.

Evans, Lieut.-Col. P., M.B., R.A.M.C.

Fawcus, Lieut.-Col. H. B., M.B., R.A.M.C.

Fell, Lieut.-Col. M. H. G., R.A.M.C.

Ferguson, Col. N. C., C.M.G., M.B.

Forrest, Lieut.-Col. J. V., M.B., R.A.M.C.

Geddes, Col. R. J., D.S.O., M.B.

Goodwin, Lieut.-Col. T. H. J. C., D.S.O.

Holt, Col. M. P. C., D.S.O.

Irvine, Major F. S., M.B., R.A.M.C.

MacLeod, Col. R. L. R.

Macpherson, Surg.-Gen. W. G., C.B.,
C.M.G., M.B., K.H.P.

Moores, Colonel S. G.

Morgan, Lieut.-Col. C. K., M.B., R.A.M.C.

O'Donnell, Surg.-Gen. T. J., D.S.O.

Penny, Lieut.-Col. F. S., M.B., R.A.M.C.

Porter, Surg.-Gen. R., M.B.

Ritchie, Capt. M. B. H., M.B., R.A.M.C.

Swan, Col. W. T., M.B.

Treherne, Surg.-Gen. F. H., C.M.G.,
F.R.C.S. Edin.

Webb, Lieut.-Col. A. L. A., R.A.M.C.

Westcott, Col., C.M.G.

1st LIFE GUARDS.

Anderson, Surg.-Lieut. E. D.

2nd LIFE GUARDS.

Luxmore, Surg.-Capt. F. J. H.

ROYAL HORSE GUARDS.

Pares, Surg.-Major B.

MEDICAL SERVICE AND ROYAL ARMY MEDICAL CORPS.

- Bowlby, Temp. Col. Sir A. A., K.C.M.G., F.R.C.S.
 Burghard, Temp. Col. F. F., M.D., F.R.C.S.
 Dawson, Temp. Col. Sir B. E., K.C.V.O., M.D.
 Gray, Temp. Col. H. M. W., M.B., F.R.C.S. Edin.
 Herringham, Temp. Col. Sir W. P., Knt., M.D.
 Lister, Temp. Col. W. T., M.B., F.R.C.S.
 Meek, Col. J., M.D.
 Makins, Temp. Col. Sir G. H., K.C.M.G., C.B., F.R.C.S.
 Moynihan, Temp. Col. Sir B. G. A., Knt., M.B., F.R.C.S.
 Wright, Temp. Col. Sir A. E., Knt., M.D., F.R.C.S.I., F.R.S.
 Young, Col. C. A.
 Ainsworth, Major R. B.
 Archibald, Qmr. and Hon. Capt. W. N.
 Barnard, Qmr. and Hon. Lieut. A. P.
 Bartlett, Major B. S.
 Bell, Capt. W. J. E., M.B.
 Birch, Qmr. and Hon. Lieut. E.
 Bond, Capt. A. H.
 Bostock, Major J. S., M.B.
 Boyce, Capt. W. W.
 Boyle, Lieut.-Col. M., M.B.
 Brown, Major R. T., M.B.
 Browne, Capt. C. G.
 Buckley, Qmr. and Hon. Capt. E. J.
 Burney, Capt. W. H. S.
 Burnham, Major H. H., attached 2nd Canadian Artillery Brigade.
 Cagney, Temp. Lieut. P., M.B.
 Cairns, Lieut. J. W., M.D. (T.F.)
 Cannon, Lieut. J. W., M.B. (S.R.).
 Carr, Qmr. and Hon. Lieut. J. (T.F.).
 Carter, Capt. H. St. M., M.D.
 Chesney, Lieut. W. McM., M.B. (S.R.).
 Clarke, Lieut. T. W., M.B. (S.R.).
 Conway, Qmr. and Hon. Lieut. T. D.
 Coplans, Capt. M., M.D. (T.F.).
 Cowey, Major R. V.
 Craig, Lieut. D. D., M.B.
 Crawford, Lieut.-Col. G. S., M.D.
 Crean, Capt. T. J., V.C. (Reserve of Officers).
 Cree, Temp. Lieut. R. E., M.B.
 Dalrymple, Temp. Capt. J.
 Darling, Capt. W., M.B., F.R.C.S. (Edin.), S.R.
 Dawson, Capt. G. F., M.B.
 Devonald, Lieut. A. E. L. (T.F.).
 Du Cros, Temp. Hon. Capt. G. H.
 Dugdale, Qmr. and Hon. Lieut. H., S.R.
 Duka, Temp. Capt. A. T., D.S.O.
 Escott, Qmr. and Hon. Lieut. E. W. J.
 Fielding, Major T. E., M.B.
 Foster, Capt. J. R.
 Franklin, Major R. J.
 Gale, Capt. R., M.B.
 Galloway, Temp. Lieut. R. W., M.B.
 Gilchrist, Lieut. A. J. (S.R.).
 Glynn, Temp. Lieut. A. S., M.B.
 Goddard, Major C. E., M.D. (T.F.).
 Green, Qmr. and Hon. Major J.
 Green, Qmr. and Hon. Lieut. R. H.
 Grenfell, Qmr. and Hon. Lieut. T.
 Harding, Major D. L., F.R.C.S.I.
 Harris, Qmr. and Hon. Lieut. G. W. (T.F.).
 Hart, Temp. Lieut. C. H., M.B.
 Haycraft, Temp. Lieut. J. B., M.B.
 Herrick, Lieut.-Col. H.
 Hewson, Capt. F. M., F.R.C.S.I.
 Hill, Temp. Lieut. F. T.
 Huicks, Lieut. A. C. (T.F.).
 Houston, Capt. J. W., M.B.
 Howell, Capt. F. D. G.
 Howell, Capt. H. L.
 Ingram, Temp. Lieut. T. L.
 Irvine, Capt. A. E. S.
 James, Temp. Lieut. P. W., M.D.
 Janion, Temp. Lieut. H. G.
 Jones, Capt. J. B., M.B.
 Just, Temp. Lieut. T. H., M.B.
 Kavanagh, Capt. E. J., M.B.
 Kelly, Lieut.-Col. J. F. M., M.B.
 Lane, Capt. J. W., M.D.
 Langstaff, Lieut.-Col. J. W.
 Le Bas, Temp. Lieut. D.
 L'Estrange, Major E. F. Q.
 Lightstone, Lieut. H. (T.F.).
 Lindsay, Lieut. A. B., M.B.
 Lister, Temp. Lieut. W. H.
 Lloyd-Jones, Capt. P. A., M.B.
 Lovell, Lieut. A. G. H., M.B., F.R.C.S.
 Lunney, Qmr. and Hon. Capt. A.
 McCarthy, Capt. W. H. L., M.D. (S.R.)
 McCurry, Lieut. W. T. (S.R.) (killed).
 Macglashan, Capt. K. B. M.D., F.R.C.S. (Edin.) (S.R.).
 Mackie, Lieut. D., M.B. (S.R.).
 McLaughlin, Capt. J. N., M.D. (S.R.).
 Maclean, Temp. Lieut. I. C., M.D.
 McLean, Lieut. W. F., M.B. (S.R.).
 McSheehy, Capt. O. W., M.B.
 Martin, Major J. F., M.B.
 Martyn, Capt. S., M.B. (T.F.).
 Miller, Lieut. W. A., M.B. (S.R.).
 Moore, Temp. Lieut. E. H., D.S.O., M.B.
 Morris, Lieut. E. M. (T.F.).
 Morrison, Qmr. and Hon. Capt. A. (Reserve of Officers).
 O'Brien, Capt. C. W.
 Offord, Qmr. and Hon. Major E. P.
 Packard, Qmr. and Hon. Lieut. J. T.
 Page, Capt. C. M., M.B., F.R.C.S. (S.R.).
 Pallant, Major S. L.
 Pemberton, Lieut. S. H., M.B. (S.R.).
 Poe, Lieut.-Col. J., M.B.
 Preston, Lieut. R. A., M.B. (S.R.)
 Priestly, Lieut. J. G., M.B.
 Richards, Major F. G. (killed).

Medical Service and Royal Army Medical Corps—continued.

- Richards, Temporary Capt. O., M.D.
 Robinson, Capt. T. T. H., M.B.
 Rogers, Major H., M.B.
 Rogers Tilstone, Lieut.-Col. J. M. (T.F.)
 Sargent, Temp. Hon. Lieut.-Col. P., M.B.,
 F.R.C.S.
 Sealley, Temp. Lieut. E., M.B.
 Shaw, Capt. J. J. McI., M.B.
 Short, Qmr. and Hon. Major J. B.
 Slayter, Lieut.-Col. E. W., M.B.
 Smith, Temp. Lieut. A. C. S.
 Smith, Temp. Lieut. P.
 Somervell, Lieut. L. C.
 Spackman, Qmr. and Hon. Major H.
 Stirling, Capt. A. D., M.B.
 Stubbs, Capt. J. W. C., M.B.
 Symons, Lieut.-Col. F. A., D.S.O., M.B.
 Thorne, Temp. Lieut. F. J., M.B.
 Thurston, Lieut.-Col. H. S.
 Trist, Capt. J. R. R. (S.R.).
 Turnbull, Temp. Lieut. D C., M.B. (died
 of wounds).
 Turner, Capt. C. H.
 Vellacott, Capt. H. F., F.R.C.S. (S.R.).
 Ward, Qmr. and Hon. Lieut. H. A.
 Wear, Lieut.-Col. A. E. L., M.D.
 Webb, Lieut.-Col. A. L. A.
 Wedd, Lieut. B. H., M.D.
 Wells, Capt. A. G.
 West, Major J. W., M.B.
 Whitehead, Capt. N. T., M.B.
 Wilkinson, Temp. Lieut. R. F.
 Wilson, Temp. Lieut. C. McM., M.D.
 Winter, Capt. H. G.
 Woolfenden, Temp. Lieut. H. F., M.D.,
 F.R.C.S.
 Wood, Capt. J. L.
 Woodhouse, Temp. Lieut. P. R., M.B.
 Worthington, Major Sir E. S., Knt., M.V.O.
 Worthington, Capt. F., M.B.
 Wylie, Lieut. T. W., M.B. (S.R.).
 Andrews, 14050 Qmr.-Serjt. W.
 Argent, 7438 Acting Serjt.-Major W.
 Arnold, 7527 Pte. P. F.
 Avery, 2217 Acting Corpl. F.
 Bardswell, 19106 Acting Corpl. G. F.
 Barron, 19812 Serjt. F. P.
 Batchelor, 10179 Pte. P.
 Benson, 7174 Pte. J. F.
 Blewitt, 9115 Pte. W. T.
 Bowler, 17964 Serjt. W.
 Boxall, 19665 Serjt. H. G.
 Burdett, 7742 Acting Corpl. G.
 Bush, 15027 S.-Serjt. W.
 Butler, 18566 Corpl. H.
 Cartwright, 7685 Pte. J.
 Chase, 7247 Pte. S. J.
 Clark, 5190 Acting Corpl. A.
 Cook, 5018 Lce.-Corpl. W. C.
 Dady, 18222 S.-Serjt. A.
 Davis, 20589 Pte. W. J.
 Deakin, 19818 Pte. J. G.
 Dewberry, 16115 Serjt.-Major E. B.
 Emmerson, 7695 Pte. F.
 Evans, 5145 Pte. A.
 Floyd, 20732 Pte. H.
 Forbes, 14924 S.-Serjt. J. G. A.
 Gibbs, 8269 Serjt.-Major G. A.
 Gillespie, 10254 Serjt.-Major A.
 Godfrey, 14452 Corpl. F.
 Greenwood, 20796 Pte. H.
 Gregory, 284 Serjt. A. O.
 Gregson, 16205 Qmr.-Serjt. T.
 Hamer, 2690 Pte. W. H.
 Harris, 18443 Serjt. G.
 Harrison, 9751 Pte. J.
 Hayne, 8633 Pte. E. W.
 Herbert, 18964 Serjt. G. W.
 Horrigan, 1675 Pte. P.
 Hutchings, 18383 Serjt. W.
 Ireson, 17576 S.-Serjt. J. R.
 Jones, 17159 S.-Serjt. (Acting Serjt.-
 Major) C.
 Jones, 2950 Pte. J.
 Knightley, 10598 Qmr.-Serjt. P. G.
 Knowles, 17277 Pte. R. N.
 Larnier, 10221 Serjt.-Major E.
 Last, 2484 Pte. W. A.
 Leaney, 1856 Serjt. A. F.
 Matchin, 12156 Pte. W.
 Mattison, 19863 Serjt. W. H.
 Mercer, 18330 Serjt. J. N.
 Merchant, 10073 Serjt.-Major W.
 Morrison, 3795 Corpl. J.
 Mulley, 19509 Acting Corpl. H. F.
 Musgrave, 18940 Qmr.-Serjt. P. H.
 O'Rourke, 12506 S.-Serjt. P. J.
 Owen, 19296 Pte. E. T. J.
 Philbrook, 18453 Qmr.-Serjt. F. A.
 Pollock, 19604 Serjt. R.
 Poole, 19192 Qmr.-Serjt. F.
 Pooley, 7536 Pte. A.
 Powell, 113 Serjt. J. D.
 Prince, 1305 Serjt. H. M.
 Prince, 15288 Qmr.-Serjt. W. C.
 Pursey, 18158 S.-Serjt. G. P.
 Reynolds, 33169 Pte. A. F.
 Richardson, 10849 Qmr.-Serjt. C. E. T.
 Roberts, 5600 Corporal R.
 Robertson, 14761 S.-Serjt. W.
 Russell, 754 Serjt. H.
 Scott, 11405 S.-Serjt. W.
 Scott-Badcock, 14290 Serjt.-Major W. H.
 Seldon, 1764 Serjt. H. W.
 Sharp, 15483 S.-Serjt. E.
 Sharpe, 10711 Serjt.-Major F. M.
 Smith, 5648 Serjt. E. F.
 Sprinks, 11441 Serjt.-Major H.
 Steele, 17568 Serjt.-Major E.
 Steer, 103 S.-Serjt. G. P.
 Stubbs, 12779 S.-Serjt. G.
 Taylor, 18772 Serjt. H. E.
 Thomas, 10200 Qmr.-Serjt. J. H.
 Thomas, 19037 Serjt. W. B.
 Thorpe, 6805 Pte. B. P.
 Toye, 17928 S.-Serjt. W. S.

Medical Service and Royal Army Medical Corps—continued.

Tunn, 9467 Acting Serjt.-Major C. J.
Walker, 8268 Serjt.-Major G. B.
Watt, 14008 Serjt.-Major D.

Whyte, 12303 S.-Serjt. W.
Wilkinson, 20852 Pte. H.

ROYAL ARMY MEDICAL CORPS (TERRITORIAL FORCE).

Bickerton, Capt. R. E., M.B., 84th Field Ambulance.
Bird, Major E. B., 26th Field Ambulance.
Blackwood, Capt. W., M.B., 25th Field Ambulance.
Burgess, Lieut. R., 24th Field Ambulance.
Cameron, Lieut.-Col. D. A., M.B., 86th Field Ambulance.
Fairbank, Capt. H. A. T., F.R.C.S., 85th Field Ambulance.
Fisher, Major D. L., M.B., 86th Field Ambulance.
Harrison, Capt. W. J., M.B., attached 6th Battalion, Northumberland Fusiliers.
Hearn, Qmr. and Hon. Lieut. C. W., 26th Field Ambulance.
Mackay, Major W. B., M.D., attached 7th Battalion, Northumberland Fusiliers.
Sharpe, Lieut.-Col. W. S., M.D., 84th Field Ambulance.
Sprawson, Capt. E. C., 3rd Division.
Waggett, Major E. B., M.B., 85th Field Ambulance.
Wardle, Lieut. V. H., 86th Field Ambulance.
Whait, Lieut.-Col. J. R., M.B., 85th Field Ambulance.
Abnett, 372 Serjt. C. W., 81st Field Ambulance.
Boundy, 1864 Pte. H., 24th Field Ambulance.
Boyes, 66 Staff-Serjt. J. T.
Burvill, 2521 Lce.-Corpl. J., 82nd Field Ambulance.
Caswell, 679 Staff-Serjt. J. C.

Dalton, 917 Lce.-Serjt. J., 1st West Lancashire Field Ambulance.
Dominy, 1601 Pte. H., 25th Field Ambulance.
Dymond, 677 Serjt. C. D., Welsh Border Mounted Brigade.
Elcock, 2057 Lce.-Corpl. P., 26th Field Ambulance.
Gotham, 127 Staff-Serjt. W. G., 25th Field Ambulance.
Gregory, 10831 Acting Serjt.-Major H. W., 26th Field Ambulance.
Hodge, 3117 Corpl. W. N., 83rd Field Ambulance.
House, 5 Acting-Serjt.-Major A. E. R., 24th Field Ambulance.
Ingleton, 707 Serjt. E., 82nd Field Ambulance.
Meigh, 1360 Lce.-Corpl. E., 1st West Lancashire Field Ambulance.
Parsons, 128 Acting Serjt.-Major T. W., 25th Field Ambulance.
Pocock, 898 Staff-Serjt. S. C., 26th Field Ambulance.
Royle, 2374 Pte. C. T., 81st Field Ambulance.
St. John, 413 Pte. J., 3rd Welsh Field Ambulance.
Sell, 972 Pte. H. C.
Stapleton, 3177 Pte. H., 83rd Field Ambulance.
Watchorn, 1790 Acting-Serjt. R. M., 3rd Welsh Field Ambulance.
Webster, 136 Staff-Serjt. J. J.
Wright, 2304 Pte. A. E., 81st Field Ambulance.

1st London (City of London) Sanitary Company.

Draycott, Lieut. C. N.

| Dore, 21 Corporal (Acting Serjt.) N. A.

2nd London Sanitary Company.

Clayton, Lieut. J.

Price, Lieut. J. H. N.

| Hadingham, 736 Staff-Serjt. W. K.

| Pickering, 765 Staff-Serjt. B.

INDIAN MEDICAL SERVICE.

Hime, Lieut.-Col. H. C. R., M.B., R.A.M.C. (attached).

EXTRACT FROM THE "LONDON GAZETTE," JUNE 23, 1915.**CENTRAL CHANCERY OF THE ORDERS OF KNIGHTHOOD.**

Lord Chamberlain's Office,
St. James's Palace, S.W.

June 23, 1915.

The King has been graciously pleased, on the occasion of His Majesty's Birthday, to give orders for the following promotions in, and appointments to, the Most Honourable Order of the Bath, for services rendered in connexion with Military Operations in the Field. The promotions and appointments to date from the 3rd inst.

To be Additional Members of the Military Division of the Third Class, or Companions, of the said Most Honourable Order:—

Col. Sinclair Westcott, C.M.G., A.M.S.	Col. Samuel Guise Moores, A.M.S.
Col. Robert James Geddes, D.S.O., M.B., A.M.S.	Lieut.-Col. Wilfred William Ogilvy Beveridge, D.S.O., M.B., R.A.M.C.
Col. Maurice Percy Cue Holt, D.S.O.	Temp. Col. Sir Almroth Edward Wright, M.D., F.R.C.S.I., F.R.S., A.M.S.
Col. James Meek, M.D., A.M.S.	Temp. Col. Frédéric François Burghard, M.D., F.R.C.S., A.M.S. (T.F.)
Col. William Travers Swan, M.B., A.M.S.	
Col. Howard Carr, M.D., A.M.S.	

CHANCERY OF THE ORDER OF ST. MICHAEL AND ST. GEORGE.

Downing Street,
June 23, 1915.

The King has been graciously pleased to give directions for the following promotions in, and appointments to, the Most Distinguished Order of St. Michael and St. George, for services rendered in connexion with Military Operations in the Field. The promotions and appointments to date from the 3rd inst.

To be Additional Members of the Third Class, or Companions of the said Most Distinguished Order:—

Lieut.-Col. Gilbert Stewart Crawford, M.D., R.A.M.C.	Lieut.-Col. Thomas Herbert John Chapman Goodwin, D.S.O., R.A.M.C.
Lieut.-Col. Hugh Stanley Thurston, R.A.M.C.	Lieut.-Col. John Charles Baron Statham, R.A.M.C.
Lieut.-Col. Stevenson Lyle Cummins, M.D., R.A.M.C.	Lieut.-Col. Arthur Lisle Ambrose Webb, R.A.M.C.
Lieut.-Col. Percy Evans, M.B., R.A.M.C.	Major James Fitzgerald Martin, M.B., R.A.M.C.
Lieut.-Col. Harold Ben Fawcus, M.B., R.A.M.C.	Major Sir Edward Scott Worthington, M.V.O., R.A.M.C.

War Office,
June 23, 1915.

His Majesty the King has been graciously pleased to approve of the undermentioned Honours and Rewards for Distinguished Service in the Field, with effect from June 3, 1915, inclusive:—

To be a Companion of the Distinguished Service Order.
Major F. S. Irvine, M.B., R.A.M.C.

Awarded the Military Cross.
Captain P. Dwyer, M.B., R.A.M.C.

To be a Companion of the Distinguished Service Order.
Surgeon-Major B. Pares.

ROYAL ARMY MEDICAL CORPS.*To be Brevet Colonel.*

Lieut.-Col. H. Ensor, D.S.O., M.B., Staff. | Lieut.-Col. M. H. G. Fell, Staff.

To be Brevet Lieutenant-Colonel.

Major J. S. Bostock, M.B.

To be Companions of the Distinguished Service Order.

Lieut.-Col. J. Poe, M.B.	Capt. R. Gale, M.B.
Major R. V. Cowey.	Capt. P. A. Lloyd-Jones, M.B.
Major T. E. Fielding, M.B.	Capt. O. W. McSheehy, M.B.
Capt. C. G. Browne.	Temp. Capt. O. Richards, M.D., F.R.C.S.,
Capt. H. St. M. Carter, M.D.	L.R.C.P.
Capt. T. J. Crean, V.C. (Reserve of Officers).	

Awarded the Military Cross.

Capt. W. Darling, M.B., F.R.C.S. (S.R.).	Lieut. W. McM. Chesney, M.B. (S.R.).
Capt. G. F. Dawson, M.B., attached 2nd Batt. Royal Highlanders.	Lieut. R. A. Preston, M.B. (S.R.).
Capt. H. L. Howell.	Temp. Lieut. D. D. Craig, M.B.
Capt. J. B. Jones, M.B.	Temp. Lieut. F. T. Hill.
Capt. E. J. Kavanagh, M.B.	Temp. Lieut. H. G. Janion.
Capt. J. W. C. Stubbs, M.B.	Temp. Lieut. P. W. James, M.D.
Capt. H. F. Vellacott, F.R.C.S. (S.R.).	Temp. Lieut. W. H. Lister.
Capt. N. T. Whitehead, M.B.	Temp. Lieut. I. C. Maclean, M.D.
Capt. H. G. Winter.	Temp. Lieut. P. Smith.
	8268 Serj.-Major G. B. Walker.

To be Honorary Major.

Qmr. and Hon. Capt. W. N. Archibald. | Qmr. and Hon. Capt. A. Lunney.

ROYAL ARMY MEDICAL CORPS (TERRITORIAL FORCE).*Awarded the Military Cross.*

Qmr. and Hon. Lieut. J. Carr, West Riding. | Qmr. and Hon. Lieut. H. Dugdale, 3rd East Lancashire Field Ambulance.

To be Honorary Captain.

Qmr. and Hon. Lieut. C. W. Hearn, 3rd Wessex (attached 26th Field Ambulance).

HIS MAJESTY THE KING has been graciously pleased to approve of the award of the Distinguished Conduct Medal to the undermentioned Warrant Officers, Non-commissioned Officers and Men, for acts of gallantry and devotion to duty whilst serving with the Expeditionary Force in France and Flanders.

The particulars of the acts of gallantry will be published in the *London Gazette* on an early date.

12751 Serjt. T. B. Carter, 19th Field Ambulance, R.A.M.C.	551 Serjt. C. Ingram, 84th (2nd London) Field Ambulance, R.A.M.C. (T.F.).
7685 Pte. J. Cartwright, 14th Field Ambulance, R.A.M.C.	105 Serjt. F. Newman, R.A.M.C.
1637 Pte. W. Herd, R.A.M.C., T.F. (attached 8th Battalion Royal Scots).	11656 Serjt. H. J. V. Voisey, R.A.M.C.
587 Pte. A. W. Howitt, R.A.M.C.	1793 Corpl. R. J. Wood, 1st Wessex Field Ambulance, R.A.M.C. (T.F.).

HIS MAJESTY THE KING has been graciously pleased to approve of Surgeon-General G. D. Bourke, C.B. (Retired), receiving an annuity of £100 for Distinguished and Meritorious Service, from January 10, 1915, *vice* Surgeon-General W. H. McNamara, C.B., C.M.G., deceased.

ARMY MEDICAL SERVICE.

Surgeon-General Sir David Bruce, Knt., C.B., F.R.S., M.B., is retained on the Active List, under the provisions of Article 120, Royal Warrant for Pay and Promotion, and to be supernumerary, dated May 29, 1915.

Captain Charles A. Ballance, M.V.O., F.R.C.S., Royal Army Medical Corps, Territorial Force, to be temporary Colonel, dated May 18, 1915.

Temporary Major Cuthbert S. Wallace, from the Royal Army Medical Corps, to be temporary Colonel, dated April 29, 1915. (Substituted for the notification which appeared in the *Gazette* of May 8, 1915.)

Major Francis J. Brown, from Deputy Assistant Director of Medical Services, to be Assistant Director of Medical Services, Lowland Division, with the temporary rank of Colonel, dated May 8, 1915.

Colonel Henry N. Thompson, D.S.O., M.B., to be Assistant Director of Medical Services, South Midland Division, *vice* Colonel John R. I. Raywood, who vacates the appointment, dated May 9, 1915.

John Atkins, M.B., F.R.C.S., to be temporary Colonel, dated October 20, 1914.

ROYAL ARMY MEDICAL CORPS.

William George Kynaston Barnes, M.D., late Deputy-Surgeon-General, Royal Navy, to be temporary Major, dated April 16, 1915.

The undermentioned to be temporary Captains:—

Dated April 17, 1915.—George Herbert Ward-Humphreys, late Surgeon-Captain, 1st Gloucestershire Engineers, Territorial Force.

Dated April 18, 1915.—Matthew Leslie Guy Hallwright, M.D.

Dated April 19, 1915.—Harry Young Cameron Taylor, M.B., F.R.C.S.; Charles Coley Choyce, M.D., F.R.C.S.

Dated April 7, 1915.—John Davidson Duncan, M.B., late Captain, 5th Battalion, The Black Watch (Royal Highlanders), Territorial Force.

Dated May 12, 1915.—Temporary Lieutenant Edward A. Evans; temporary Lieutenant James A. Torrens, M.B.

Dated May 26, 1915.—Norman Black, M.B., late Captain, Singapore Volunteer Corps; John Paton, M.D., late Captain, Royal Army Medical Corps, Territorial Force.

Dated April 27, 1915.—Henry Mainwaring Holt, Home Hospitals Reserve.

Dated May 1, 1915.—George Blacker, M.D., F.R.C.S.

The undermentioned to be Honorary Majors:—

Dated May 23, 1915.—Quartermaster and Honorary Captain Thomas Exton.

Dated May 30, 1915.—Quartermaster and Honorary Captain Roderick Robinson Cowan.

The undermentioned to be temporary Quartermasters, with the honorary rank of Lieutenant:—

Dated April 12, 1915.—Emmanuel Denis Gordon.

Dated April 22, 1915.—William Charles Marsden.

Dated April 24, 1915.—Charles Greenhough.

Dated April 27, 1915.—Thomas Clement; Frederick Arthur Mulley; John Robinson, Home Hospitals Reserve; Patrick Plunkett.

Dated April 30, 1915.—Arthur Johnson; Frederick Evans.

Dated May 1, 1915.—Charles Richard William Keefe.

Dated May 10, 1915.—Ernest Thuillier.

Dated May 11, 1915.—Henry George Miller.

Dated May 12, 1915.—George Havelock Kelf.

Dated May 17, 1915.—Nash Cornell; George Foster; George Jackson.

Dated May 18, 1915.—William Moore; Samuel Gregg.

Dated May 21, 1915.—Frederick Herbert Middleton.

Temporary Quartermaster and Honorary Lieutenant William Carey relinquishes his commission on account of ill-health, dated April 27, 1915.

The undermentioned Serjeant-Majors to be Quartermasters, with the honorary rank of Lieutenant.

Dated May 9, 1915.—Walter Ernest Squire; David Charles Baxter; Ernest Janes; James Maurice Maxwell; Henry Sprinks; Walter Clegg; Charles Joseph Hazell; Harry John Reeve; Joseph James Earp; Henry John Anderson.

Dated June 5, 1915.—Charles Frederick Houston; Arthur McCreeth; John Henry McClelland; Henry Robinson; Robert Ashton; Harry Steele; David Watt.

The undermentioned to be temporary Lieutenants:—

Dated March 12, 1915.—James Rashid Wortabet, M.B.

Dated March 15, 1915.—Arthur Cyril Albert Jekyll, M.B.; Cedric Keith Cohen, M.B.; Eric Payten Dark, M.B.

Dated March 17, 1915.—Keith Gemmell Colquhoun, M.B.; Clive Travers Stephen, M.B.; Henry Cecil Colville, M.B.; Alan Pryde, M.B.

Dated March 19, 1915.—Charles Francis Drew, M.B.

Dated March 21, 1915.—Charles Montagu Harris, M.D.

Dated March 23, 1915.—Edward Rogerson, M.B.; Louis Michael Pigott, M.B.; Reginald Blockley Lucas, M.B.; William Heitland Godby, M.B.; Norman Edward Packer, M.B.; Charles Owen Donovan, M.B.; John Thomson Anderson, M.B.; Robert Burnside Carter, M.B.; Eric Phillip Blashki, M.B.; John Lloyd Digby, M.B.; Norman McAlister Gregg, M.B.; Eustace Townley Pinhey, M.B.; Norman Walford Broughton, M.B.; Sydney William Gardiner Ratcliff, M.B.; Clive Farranridge, M.B.; Arthur Wilmot Raymond, M.B.

Dated March 26, 1915.—Harold John Penny, M.B.; John Joseph O'Neill, M.B.; Brian William Wibberley, M.B.

Dated April 4, 1915.—Bruce Maitland Carruthers, M.B.; Gordon Alick Renwick, M.B.; John Roberts MacCulloch, M.B.; Charles Goldsborough Adams, M.B.; Walter Francis Stewart Yeates, M.B.; Charles Horsfall Armitage, M.B.; Charles Reginald Ralston Huxtable, M.B.; Francis James Fahy, M.B.; Hugh Alton Chandos Wall, M.B.; Archibald Warden Graves Murray, M.B.; Cuthbert Arnold Verge, M.B.

Dated April 6, 1915.—Ernest Robertson, M.B.; Basil Walter Cohen, M.B.; Norman Charles Talbot, M.B.; Colin Hasler Martin, M.B.; Alexander Hugh Melville, M.B.; Frederick Harold Moran, M.B.; Archibald Simpson Anderson, M.B.; Harold Whitfield Ward, M.B.; Charles Frederick Strange; Roger Orme Bridgman; Russell William Richards, M.B.

Dated April 7, 1915.—Hugh Meyrick Meyrick-Jones, M.D.; William Stuart Hawthorne, M.B.

Dated May 24, 1915.—Lewis Wilson Shelly.

The undermentioned to be temporary Lieutenants whilst serving with the British Red Cross Hospital, Netley.

Dated March 1, 1915.—William Harle Stott.

Dated April 9, 1915.—Alexander Hugh Dickson Smith.

Dated April 12, 1915.—Michael Thomas MacMahon, M.B.; Captain Charles Francis White, M.B., 6th Battalion, The Cheshire Regiment.

Dated April 14, 1915.—Noel Campbell, M.B.; Lorne Benjamin Graham, M.B.; Percy Herbert Delamere; Arthur Lincoln Thornley, M.B.; Arthur Henry Priestley, M.B.; James Robert Robertson; John Hay Moir, M.D.; Arthur Thomson, M.B.; Arthur William Hare, M.B.; Alexander Mitchell Cowie, M.B.; Reginald Newton Weekes; Lindsey Willett Batten; Charles Harold Walker McCullagh, M.D.; Alfred Douglas Bigland, M.D.; Cyril Meredith Willmott; Alexander Fisher, M.B.; Joseph McGowan, M.D.; Edward Mapother, M.D., F.R.C.S. Francis Bernard Yonge to be temporary Lieutenant.

Dated April 15, 1915.—Thomas Dymock Kennedy, M.B.; George Harold Wood, M.B.; Philip Northcote Vellacott, M.B., F.R.C.S.; Norman Stephen Gilchrist, M.D.; Guy Budd Courtney, M.D.; Frederick John Blackley, M.D.; Charles Herdman Newton; M.B.; Robert McCorran Service, M.D.; John Porter, M.B.; Frederick James Pierce; Robert John Merson, M.B.; Frederick William Smith Stone; John Eills Gething, M.B.; William Alexander Gordon Russell, M.B.; Langford George Davies, M.B.; James Hinton Robertson, M.B.; Thomas Steven McIntosh, M.D.; Robert Barsham Debenham; John Caruthers Sale; Kerr Simpson, M.B.

Dated April 16, 1915.—John Scott, M.B.

Dated April 17, 1915.—Theodore Francis Dillon, M.B.; Herbert Mather Spoor, M.B.; Herbert Frederick Nolan; Walter Halli Burton MacDonald; Hugh Hamilton Moffat; Alexander Waugh, M.B.; Edwin Fryer; George Hellyard Darlington, M.B.; Frederick George Thompson, M.B.; Frank Graham Wrigley, M.D.; James Hay Marshall, M.B.; Arthur Leonard Weakley, M.B., F.R.C.S. Edin.; Victor Jenner Batteson; Guy Stuart Goodwin, M.D.

Dated April 19, 1915.—John Rowat, M.D.; Evan Lewis Hickey, M.D.; James Jenkins Robb, M.D.; Alphonsus McGrath, M.B.; William Claude Percy Barrett, M.B.; Arthur Macgregor Warwick, M.B.; Bertram Ernest Wright, M.B.; Crawford Smith Crichton, M.D.; Thomas Leathard Wormald, M.D.; William George Hopkins; Francis Charlesworth, M.B.; George Stanley Applegate; Robert Macnair Walker, M.B.;

Arthur Herbert Butcher ; Arthur Edward Druitt ; Herbert Arthur Hancock ; Michael Joseph Petty, M.B., F.R.C.S. ; Richard Kenefick, M.B. ; George Robertson Lipp, M.B. ; John William Nelson Roberts, M.B. ; Tom Stansfield, M.B. ; Wilberforce John James Arnold, M.B.

Dated April 20, 1915.—William Carnes ; Gerald William Stone ; Riccardo Stephens, M.B. ; James Clarkson Waithman, M.D. ; George Basil Price, M.D. ; William Robert Etches, M.D.

Dated April 21, 1915.—Geoffrey Ward Thompson, M.D. ; Henry Carter Thorp, M.B. ; William Arthur Shann, M.B. ; Cunison Charles Finlater, M.D. ; Ralph Paul Williams, M.D. ; William Peach Taylor ; Norman Grellier ; Hugh Stevenson Davidson, M.B., F.R.C.S. Edin. ; Tom Entwisle Ferguson ; John Forbes, M.B. ; David Johnston, M.B. ; James Charles Martin ; John Wright Turner, M.B. ; Thomas Wright, M.B. ; Arthur George James Thompson, M.B. ; Thomas Warner, M.D., F.R.C.S. ; Walter Charles Blackham, M.B. ; Walter Dymock Perry ; George Hugh Culverwell, M.D. ; Robert Wilson Buchanan, M.B. ; William Penberthy ; Isidore Jack Block, M.B. ; Thomas Gilchrist, F.R.C.S.I.

Dated April 22, 1915.—Denis Fitzgerald O'Kelly ; James Boyd, M.B. ; Arthur Thomson Marshall, M.B. ; John Brunton, M.D. ; Barrington William Mudd, M.B. ; Ray Cecil Phelps, M.B. ; Harry Lovett Cumming, M.D. ; James Hamilton Bogan, F.R.C.S.I.

Dated April 23, 1915.—James Lawson Whatley ; John Hay Heddle ; Ivan Whiteside Magill, M.B. ; Charles Gibson, M.B. ; Edmund Sheppard Cuthbert ; John Moir McKenzie, M.B. ; James Murdoch MacKay, M.B. ; Donald McDonald McIntyre, M.B. ; Thomas Ruddock-West, M.B.

Dated April 24, 1915.—Joseph Henri Napoleon Felix Savy, M.B. ; Henry Adams, M.B. ; Colin George Shearer, M.B. ; James David Mackinnon, M.B. ; Alfred George Brown Duncan, M.B. ; Herbert Hampden Taylor, M.B. ; George Fleming, M.B. ; John Ross, M.B. ; William Fleming Stevenson ; Thomas Holmes Scott, M.B. ; George Francis Clegg Walker, M.B. ; William Magner, M.B. ; Joseph Edward Judson ; Thomas Battersby Jobson, M.D. ; Joseph Humphrey Jones ; Godfrey Douglas Hindley, M.B. ; James Henry Edwin Davis ; Thomas Clifford, M.B. ; Valentine Henry Blake, M.B. ; Alfred Reginald Roche ; Maurice Gerald McElligott, F.R.C.S. ; Denis Victor O'Connor ; Robert Bern Tydd Stephenson, M.D. ; John Rhodes Dickson, M.B. ; Sidney James Wareham, F.R.C.S. ; James Johnston Abraham, M.D., F.R.C.S.

Dated April 25, 1915.—Daniel Owen Twining ; Arthur Lawrence Jackson, M.B. ; Everard Cecil Abraham, M.B. ; Wilfred Raffle ; Cedric Roland Denny ; Horace Carlos Barr.

Dated April 26, 1915.—Edgar Taunton, M.B., F.R.C.S. ; Richard Harrison ; George Todd MacLean, M.B. ; Geoffrey Andrew Bird, M.B. ; David Fleck, M.B. ; Caleb Thomas Hilton, M.B. ; Stanley Elder Humphreys, M.B. ; Williamson Rust Reith, M.D. ; John Sneed Bookless, M.B., F.R.C.S. ; Charles Forbes Harford, M.D. ; Stephen Veitch Telfer, M.B. ; James Smith, M.B. ; Alexander Cameron Renwick, M.B. ; George Loudon Neil ; Gerard Edward Lockyer ; John Kean ; Robert Thomas Herron, M.D. ; Ernest Edward Frazer, M.D. ; Andrew Crawford ; William Reginald Ward Asplen, M.B. ; Richard Henry George Weston, M.B., from 15th (Service) Battalion, The King's (Liverpool Regiment).

Dated April 27, 1915.—Charles Gordon MacKay, M.B. ; Cecil Claude Cragg, M.D. ; John Newbury Fraser Ferguson, M.B. ; John Menlove Bennion, M.D. ; Arthur Richmond, M.B. ; George McMullan, M.D. ; Alfred MacKenzie Clark, M.B. ; Reginald Frederick Yencken ; Aubrey John Colby Tingey ; John Roberts Pate, M.B. ; Charles Edwin Price ; William Samuel Nason, M.B. ; George Sefton Miller, M.B. ; Robert James Ledlie, M.B. ; Colin More Geddie, M.B. ; Frank Jubb ; John Harry Hebb, M.B. ; John Bowes, M.D. ; Charles Coventry, M.B. ; Reginald Tom Cox, M.B. ; John Howe, M.B. ; William Ritchie Main ; Alfred Hardman Mountcastle ; William Francis Gordon Scott ; Arthur Sydney Webley.

Dated April 28, 1915.—Thomas Gee Williams, M.B. ; Oliver Heath, M.B. ; John McKenzie, M.B. ; Hassell Dyer Field ; Walter Edward Cooper ; Robert Hanham Cox, F.R.C.S.I. ; Charles Crerar, M.B. ; Stanley Donovan Adam ; William Wallace, M.D. ; James Ash ; Richard John Batty, M.B. ; John Harry Saunders, M.B. ; Thomas Harold Phillips.

Dated April 30, 1915.—John Joseph McConnell ; William Sinclair Stevenson, M.D.

Dated May 1, 1915.—William Robert Watt, M.B. ; Alexander Duncan ; Roland Danvers Brinton, M.D. ; Henry Hugh Rose Clarke ; Arthur Matthey ; George Douglas Kerr ; Edward Patrick Carey, M.B. ; George Stephen Ware, M.B. ; James Francis

Wolfe, M.B.; Samuel Wyborn; Roy Mackenzie Stewart, M.B.; Henry Spinks; Thomas Forbes Brown Reid, M.D.; Frederick William Rowland, M.D.; Clayton Campbell Harris; Thomas Henry Harker, M.D.; Montague David Eder; Robert Park, M.D.; Eliot Watson Blake; Bernard Pickering, M.B.; Harold Heafford Proudfoot, M.B.; James Thomas Macnamara; Archibald George Kirkwood Ledger, M.D.; Alan Randle, M.D.; Robert Alexander MacKenzie Macleod, M.D.; Benjamin Henry Shaw, M.D.; Howel Gabriel Gwyn Jeffreys; William John Dunlop; Alexander Smith Allan; Michael Alfred McKeever, M.B.; Sidney Ernest Holder; John Hamilton Hart; Norman Devereaux; John Harmer Drow, M.D.; Reginald Wynyard Davies, M.B.; George Edward Kinnersly; John Gawler Murray; John MacDonald, M.B.; William George Ridgeway Macauley; John Purcell; George Mallock Bluett; John Lancelot Atkinson, M.D.; Reginald Thompson Raine; Cecil Price Jones, M.B.; Henry Harvey; William Albert Rogerson; Francis Bernard Chavasse; Michael John McCarthy; David Lindsay Hutton; Worsley John Harris; Stanley Allman Hall; Edgar Duesbury Wellburn; Richard Hugh Williams; James Cameron Turnbull, M.D.; David Moodie; Joshua Bower Dalton, M.B.; Cyril Mary Brophy; James Rae, M.D.; Charles Edward Fenn, M.D.; Leslie Fraser Filoart Jeffcoat, M.B.; Ernest George Swarder, M.B.; Andrew Duffield Blakeley, M.B.; Thomas Maitland Crawford; Augustus Lower Paliologus; Robert Hughes, M.B.; Richard Dowden, M.D.; Henry Porter D'Arcy Benson, M.D., F.R.C.S. Edin.; Martin Ashley, M.B.; William Kenneth Bigger; George Barthorpe Simpson; Guy Verney Fletcher; William Stewart Stolker, M.D.

Dated May 2, 1915.—Percy Haycroft Berry.

Dated May 8, 1915.—John Jones, M.D.

Dated May 10, 1915.—Lewis Edward Barnett, M.B., F.R.C.S.

Dated May 14, 1915.—Arthur Bernard Wills Rust.

Dated May 15, 1915.—John Macqueen, M.B., from Royal Field Artillery.

Dated May 18, 1915.—Gordon Normanby Brandon.

Dated May 21, 1915.—Francis Mark Farmer to be temporary honorary Lieutenant; William Meeke.

Dated May 22, 1915.—Edwin Picton,

Dated May 23, 1915.—William Burt.

Temporary Lieutenant Owen Richards, M.D., to be temporary Captain, dated May 21, 1915.

ROYAL ARMY MEDICAL CORPS.—SPECIAL RESERVE.

TERRITORIAL FORCE.

Major Charles Roberts, M.B., having ceased to perform duty with No. 18 Field Ambulance, resigns his commission, dated April 14, 1915.

Captain Wilson Harold Percy Hey, M.B., F.R.C.S., 2nd Western General Hospital, Royal Army Medical Corps, Territorial Force, to be Captain, dated April 14, 1915.

The undermentioned Lieutenants to be Captains:—

Dated April 6, 1915.—William F. McLean.

Dated April 25, 1915.—Robert M. Beath.

Dated April 30, 1915.—Thomas Walker.

Dated May 1, 1915.—William St. L. Dowse; William McN. Walker; William McK. H. McCullagh.

Dated May 3, 1915.—Harry D. Rollinson.

Dated May 8, 1915.—Samuel R. Armstrong.

The undermentioned Lieutenants (on probation) are confirmed in their rank:—

John R. Crolius; Robert H. Williams; Arthur C. Bateman; Edmond Robinson; Charles A. Mason; Peter MacCallum; Gilbert W. Rose; Donald C. Scott; James S. Robinson; Stanley B. King; William T. Hare; John D. MacCormack; Henry R. Sheppard; Donald C. Macdonald.

The undermentioned to be Lieutenants (on probation):—

Dated April 2, 1915.—Robert Orr Colquhoun Thomson.

Dated April 6, 1915.—Cadet Serjeant George Gibson Cooper, from the Glasgow University Contingent, Officers Training Corps.

Dated April 21, 1915.—Arthur Eaton Richmond, ex-Cadet of the Officers Training Corps.

Dated April 24, 1915.—Geoffrey Bede Egerton, M.B., ex-Cadet of the Officers Training Corps; William Murdoch, M.B.

Dated April 29, 1915.—David William Jabez Andrews.

NOTES FROM SIMLA.—Colonel E. Eckersley, Assistant Director of Medical Services (British Service), writes as follows, dated Simla, May, 1915 :—

" *Appointments.*—Lieutenant-Colonel L. Wood, R.A.M.C., has been appointed to the collateral Medical Charge, Cadet College, Quetta.

" The following officers have been appointed to command the Station Hospitals noted against their names.

" Major J. H. Duguid, Station Hospital, Risalpur, temporary.

" Major J. H. Robinson, Station Hospital, Peshawar.

" Major G. F. Sheehan, Station Hospital, Lahore Cantonment.

" Major R. McK. Skinner, Station Hospital, Calcutta.

" Major F. W. W. Dawson, Station Hospital, Dalhousie.

" Major F. W. Cotton, Station Hospital, Jutogh.

" Major J. Mackenzie, Station Hospital, Jalapahar.

" Captain C. H. H. Harold, Station Hospital, Dagshai.

" Captain M. Keane, Station Hospital, Ferozepore.

" *Specialists.*—Captain E. P. A. Smith, R.A.M.C., is appointed Specialist in Dermatology, 8th (Lucknow) Division.

" Captain L. Murphy, R.A.M.C., is appointed Specialist in Prevention of Diseases, Brigade Laboratory, Karachi.

" *Transfers.*—The following transfers have been ordered :—

" Captain R. C. Priest, R.A.M.C., from 8th (Lucknow) Division to 4th (Quetta) Division.

" Captain M. Keane, R.A.M.C., from 9th (Secunderabad) Division to 3rd (Lahore) Divisional Area."

TERRITORIAL FORCE DECORATION.

The King has been graciously pleased to confer the Territorial Decoration upon the undermentioned officers of the Territorial Force who have been duly recommended for the same under the terms of the Royal Warrant dated August 17, 1908 :—

ROYAL ARMY MEDICAL CORPS.

Attached to 4th (City of Dundee) Battalion, The Black Watch (Royal Highlanders).

—Major James S. Y. Rogers, M.B.

3rd South Midland Field Ambulance.—Lieutenant-Colonel James Young, M.D.

2nd Welsh Field Ambulance.—Lieutenant-Colonel Alfred W. Sheen, M.D.

3rd Scottish General Hospitals.—Quartermaster and Honorary Major William Lee. Assistant Director of Medical Services.—Colonel Henry G. Falkner.

TERRITORIAL FORCE.

1st Southern General Hospital.—Frederick William Ellis, M.D., F.R.C.S., to be Lieutenant-Colonel (temporary), whose services will be available on mobilization, dated April 27, 1915; John Barron, to be Quartermaster, with the honorary rank of Lieutenant, dated April 27, 1915; Major James T. J. Morrison, M.B., F.R.C.S., is restored to the establishment, dated May 3, 1915; Herbert Charles Horace Bracey, M.B., to be Lieutenant, dated May 1, 1915; Arthur Harry Newton, M.B., to be Lieutenant, dated May 5, 1915. The undermentioned to be Captains, whose services will be available on mobilization, dated May 8, 1915: George Percival Mills, M.B.; Andrew Russell Bearn, M.D., F.R.C.S.; Arthur Augustus Russell Green. William Albert Stokes to be Lieutenant, dated May 8, 1915; Edward Musgrave Woodman, F.R.C.S. (late temporary Lieutenant, Royal Army Medical Corps), to be Captain, whose services will be available on mobilization, dated May 15, 1915; Lieutenant-Colonel Harry G. Barling, F.R.C.S., is seconded, dated May 16, 1915; Captain Albert Lucas, F.R.C.S., to be Major, dated May 22, 1915; Major Otto J. Kauffmann, M.D., to be Lieutenant-Colonel, dated May 23, 1915; Christopher Martin, M.B., F.R.C.S., to be Captain, whose services will be available on mobilization, dated May 3, 1915; Leonard Kirkby Thomas to be Captain, whose services will be available on mobilization, dated May 3, 1915; Ralph Fitz-James Sawyer to be Quartermaster, with the honorary rank of Lieutenant, dated June 2, 1915.

2nd Southern General Hospital.—Thomas Jones to be Quartermaster, with the honorary rank of Lieutenant, dated May 1, 1915; Captain William Cotton, M.D., is seconded, dated May 13, 1915; Lieutenant James G. McLannahan, from 3rd South Midland Field Ambulance, to be Captain on the permanent personnel, dated May 29, 1915.

3rd Southern General Hospital.—Arthur John Drew, F.R.C.S., to be Captain, whose services will be available on mobilization, dated April 28, 1915; Edward Walton Spencer Rowland to be Captain, whose services will be available on mobilization, dated May 1, 1915; Hugh Anthony Bulstrode Whitelocke to be Lieutenant, dated May 5, 1915.

4th Southern General Hospital.—Robert Jaques to be Captain, whose services will be available on mobilization, dated May 9, 1915.

1st Northern General Hospital.—William Moseley to be Quartermaster, with the honorary rank of Lieutenant, dated February 19, 1915; the date of appointment of Captain Stuart McDonald, M.D., F.R.C.P., is March 27, 1915, and not as stated in the *London Gazette* of April 23, 1915; James Dunlop Lickley, M.D., to be Lieutenant, dated April 27, 1915; William Stott, M.B., to be Lieutenant, dated May 14, 1915.

2nd Northern General Hospital.—Serjeant-Major Launcelot Matthews to be Quartermaster, with the honorary rank of Lieutenant, dated March 30, 1915; the undermentioned to be Captains, whose services will be available on mobilization, dated April 23, 1915: Carlton Oldfield, M.D., F.R.C.S.; Leonard Alfred Rowden, M.B.; Alfred Gough, M.B., F.R.C.S.; Henry Harold Greenwood, M.B.; Joseph Albert Blayney; Arthur Ellison; Frederick William Marshall Greaves, M.B.; John Kay Jamieson, M.B., to be Major (temporary), on the permanent personnel, dated May 13, 1915.

3rd Northern General Hospital.—Captain Arthur G. Yates, M.D., to be Major, dated April 26, 1915.

4th Northern General Hospital.—Christopher Wilfred Sharpley to be Lieutenant, dated May 1, 1915.

5th Northern General Hospital.—Ernest William Holyoak, M.B., to be Captain, whose services will be available on mobilization, dated May 6, 1915; Frederick Valentine Milburn to be Captain, whose services will be available on mobilization, dated May 7, 1915; the undermentioned to be Captains, whose services will be available on mobilization, dated May 7, 1915: Everard Harrison, M.B.; Henry Mason, M.D.; Neville Ivens Spriggs, M.D., F.R.C.S.; Alfred Ernest Payne, M.B., to be Captain, whose services will be available on mobilization, dated May 12, 1915.

Highland Mounted Brigade Field Ambulance.—Captain John W. Mackenzie, M.D., to be temporary Major, dated January 1, 1915; Lieutenant Lachlan M. V. Mitchell, M.B., to be temporary Captain, dated January 1, 1915. Lieutenant Alexander F. Lee, M.D., to be temporary Captain, dated January 1, 1915; Charles Riggall to be Transport Officer, with the honorary rank of Lieutenant, dated May 8, 1915.

Highland Divisional Sanitary Section.—Captain James M. McQueen, M.B., from 1st Scottish General Hospital, to be Captain, dated April 24, 1915.

Highland Casualty Clearing Station.—James Davidson, M.B., to be Lieutenant, dated April 23, 1915; Captain Alexander Don, M.B., F.R.C.S. (Edinburgh), from 1st Scottish General Hospital, to be Major (temporary), dated April 24, 1915; John Innes, M.B. (late Captain, 2nd Highland Field Ambulance), to be Captain (temporary), dated May 7, 1915.

2nd Highland Field Ambulance.—The date of appointment of Lieutenant Thomas S. Slessor, M.B., is December 18, 1914, and not as stated in the *London Gazette* of January 23, 1915; John Moir, M.B., to be Lieutenant, dated April 29, 1915; Reginald Percy Morrison to be Quartermaster, with the honorary rank of Lieutenant, dated April 28, 1915.

3rd Highland Field Ambulance.—Lance-Corporal James Stewart Richardson Smith (late Second Lieutenant, 5th (Angus and Dundee) Battalion, The Black Watch (Royal Highlanders)) to be Quartermaster, with the honorary rank of Lieutenant, dated May 29, 1915; Alexander Reid Moodie, M.B. (late Second Lieutenant, St. Andrews University Contingent, Senior Division, Officers Training Corps), to be Lieutenant, dated June 8, 1915; Alexander Brown Jamieson, M.B., to be Lieutenant, dated June 8, 1915.

1st Scottish General Hospital.—Ian Gordon Bisset, M.B., to be Lieutenant, dated March 8, 1915; the undermentioned to be Lieutenants, dated March 31, 1915: Herbert John Adam Longmore, M.B.; Douglas Wales Berry, M.B.; Cadet Cameron Macdonald Nicol, M.B., from Aberdeen University Contingent, Senior Division, Officers Training Corps.

4th Scottish General Hospital.—Willie Whitelaw, M.B., to be Captain, whose services will be available on mobilization, dated April 11, 1915.

2nd Lowland Field Ambulance.—The undermentioned to be Lieutenants: William Grove, M.B., dated April 15, 1915; William Jack Scade, M.B., dated April 19, 1915.

3rd Lowland Field Ambulance.—Captain James Young, M.B., F.R.C.S., to be temporary Major, dated May 1, 1915.

1st Lowland Field Ambulance.—Frank Morton Robertson, M.B., to be Lieutenant, dated April 19, 1915; Alexander Graham Buchanan, M.B., to be Lieutenant, dated May 5, 1915; Serjeant-Major John Graham Hanson to be Quartermaster, with the honorary rank of Lieutenant, dated May 4, 1915.

Lowland Mounted Brigade Field Ambulance.—The undermentioned to be Lieutenants: John Richmond Herbertson, M.B., dated March 30, 1915; Stuart Spence Meighan, M.B., dated March 30, 1915; Thomas Cameron Houston, M.B., dated April 2, 1915.

Lowland Divisional Sanitary Section.—Lieutenant Thomas J. Mackie, M.B., from attached to Units other than Medical Units, to be Lieutenant, dated May 8, 1915.

Lowland Casualty Clearing Station.—Major John McKie, M.B., from the 2nd Lowland Field Ambulance, to be Lieutenant-Colonel, dated April 26, 1915; Major George Robert Livingston, M.D., from attached to Units other than Medical Units, to be Major, dated May 7, 1915; the undermentioned to be Lieutenants, dated May 7, 1915: Lieutenant Stuart Robertson, M.B., from the 1st Lowland Field Ambulance; Lieutenant Stephen Anderson MacPhee, M.B., from the 2nd Lowland Field Ambulance; Lieutenant Adam Rankine, M.B., from the 1st Lowland Field Ambulance; William Cullen, M.B., dated May 10, 1915; Serjeant-Major Charles Thompson, from the 4th Scottish General Hospital, to be Quartermaster, with the honorary rank of Lieutenant, dated May 7, 1915.

1st London (City of London) Sanitary Company.—Vincent Philip Norman (Lieutenant, Indian Medical Service), to be Lieutenant, dated April 5, 1915; Private John Golding, from the 28th (County of London) Battalion, The London Regiment (Artists Rifles), to be Lieutenant, dated April 8, 1915; Gilbert Norman Anderson, M.B., to be Lieutenant, dated April 15, 1915; Corporal Cuthbert Edmund Caulfield Ferrey, to be Lieutenant, dated May 22, 1915; Lieutenant John H. Baldwin to be temporary Captain, dated May 30, 1915.

2nd London Sanitary Company.—Frederick George Rose, to be Lieutenant, dated March 18, 1915; Arthur Errington Rayner to be Lieutenant, dated May 1, 1915. The date of appointment of Lieutenant Owen H. Peters, M.B., is April 15, 1915, and not as stated in the *London Gazette* of May 6, 1915. The undermentioned to be Lieutenants, dated May 8, 1915: Edwin Josiah Messent; Arthur George Whitefield; Lieutenant Arthur H. Savage, M.D., from 1st South Western Mounted Brigade Field Ambulance, to be Lieutenant, dated May 23, 1915.

3rd London (City of London) Field Ambulance.—The promotion of Major John A. Masters, M.D., to temporary Lieutenant-Colonel, which appeared in the *London Gazette* of December 15, 1914, is ante-dated to November 3, 1914.

3rd London General Hospital.—Lieutenant Alfred Hope Gosse, M.D., to be Captain on the permanent personnel, dated February 22, 1915; William Francis Bensted Bensted-Smith to be Lieutenant, dated April 10, 1915; Serjeant-Major Thomas Duncan Cameron to be Quartermaster, with the honorary rank of Lieutenant, dated May 22, 1915.

4th London General Hospital.—Major William A. Turner, M.D., is restored to the establishment, dated May 6, 1915; Staff-Serjeant Simon Duparc to be Quartermaster, with the honorary rank of Lieutenant, dated May 8, 1915; Edward Bellis Clayton to be Captain, whose services will be available on mobilization, dated June 8, 1915.

4th London Field Ambulance.—Transport Officer and Honorary Lieutenant Bayard E. T. Randall resigns his commission, dated June 2, 1915.

5th London Field Ambulance.—Lieutenant-Colonel Edward Lloyd-Williams, from the Territorial Force Reserve to be Lieutenant-Colonel (temporary), dated December 23, 1914; Quartermaster-Serjeant Robert William Monro, from the London Mounted Brigade Field Ambulance, to be Quartermaster, with the honorary rank of Lieutenant, dated June 8, 1915.

London Mounted Brigade Field Ambulance.—John Peers MacLulich, M.D. (late Captain, South African Medical Corps), to be Captain (temporary), dated May 6, 1915.

1st London Casualty Clearing Station.—William S. Forbes, M.B., from the Unattached List for the Territorial Force, to be Captain, dated May 23, 1915.

1st Home Counties Field Ambulance.—William Thomas Henderson, M.B., to be Lieutenant, dated May 3, 1915.

2nd Home Counties Field Ambulance.—Henry Travers Jones, M.B., to be Lieutenant, dated May 3, 1915; Major Antony A. Martin, M.D., to be temporary Lieutenant-Colonel, dated May 16, 1915; Serjeant-Major Thomas James Herbert to be Quartermaster, with the honorary rank of Lieutenant, dated June 8, 1915.

3rd Home Counties Field Ambulance.—John Francis Molyneux to be Lieutenant, dated March 9, 1915; William Walter Maxwell, M.D., to be Lieutenant, dated May 11, 1915.

1st Wessex Field Ambulance.—Quartermaster-Serjeant William Stevens to be Quartermaster, with the honorary rank of Lieutenant, dated April 16, 1915.

2nd Wessex Field Ambulance.—Ernest Hall Scholefield, M.B., to be Lieutenant, dated April 14, 1915; Staff-Serjeant Ernest Sydney Hawken Caple to be Quartermaster, with the honorary rank of Lieutenant, dated May 18, 1915.

3rd Wessex Field Ambulance.—George Duncan Campbell Stokes to be Quartermaster, with the honorary rank of Lieutenant, dated May 6, 1915; Captain Harold W. Read, from attached to Units other than Medical Units, to be Captain, dated May 16, 1915.

1st South Western Mounted Brigade Field Ambulance.—Lieutenant Ivan C. Keir, M.D., to be Captain, dated December 16, 1914.

1st Western General Hospital.—Walter Charles Oram, M.D., to be Captain, whose services will be available on mobilization, dated April 19, 1915; Charles Philip Brentnall to be Lieutenant, dated April 1, 1915; Leslie Oldershaw to be Lieutenant, dated April 10, 1915; Captain Keith W. Monsarrat, M.B., is seconded, dated May 14, 1915; Major James M. Beattie, M.D., from 3rd Northern General Hospital, to be Major, dated June 6, 1915.

2nd Western General Hospital.—Harry Platt, M.B., F.R.C.S., to be Captain, whose services will be available on mobilization, dated April 20, 1915.

Notts and Derby Mounted Brigade Field Ambulance.—Captain Oswald Kentish Wright, M.B., to be temporary Major, dated May 4, 1915.

1st Eastern General Hospital.—William Lombard Murphy to be Captain, whose services will be available on mobilization, dated May 18, 1915; Henry Samuel Crichton Starkey to be Captain, whose services will be available on mobilization, dated June 8, 1915.

Eastern Mounted Brigade Field Ambulance.—Vernon Montague Wallis to be Lieutenant, dated May 8, 1915.

South Eastern Mounted Brigade Field Ambulance.—Lieutenant Charles E. Silvester, M.B., to be Captain, dated May 18, 1915; Alexander Graham Speirs Logie, M.B., to be Lieutenant, dated April 19, 1915; William Tresawna, M.B., to be Lieutenant, dated May 12, 1915.

Welsh Border Mounted Brigade Field Ambulance.—Lieutenant Walter S. Snell resigns his commission, dated May 11, 1915.

South Wales Mounted Brigade.—The date of promotion of Major James MacK. Harrison, M.B., to Lieutenant-Colonel, is January 5, 1915, and not as stated in the *London Gazette* of March 26, 1915.

South Wales Mounted Brigade Field Ambulance.—Transport Officer and Honorary Lieutenant Thomas Thomas resigns his commission, dated May 29, 1915.

1st Welsh Field Ambulance.—Lieutenant John Clarke, from attached to Units other than Medical Units, to be Lieutenant, dated April 28, 1915.

3rd Welsh Field Ambulance.—Major John Livingstone, M.B., from attached to Units other than Medical Units, to be Major, dated April 28, 1915; Transport Officer and Honorary Lieutenant William J. Ackland resigns his commission, dated June 4, 1915.

1st Northumbrian Field Ambulance.—Captain George H. Spencer to be temporary Major, dated April 14, 1915.

2nd Northumbrian Field Ambulance.—Henry Stonehouse to be Lieutenant, dated April 17, 1915; Oswald Bastable (late Second Lieutenant, 5th Battalion, The York and Lancaster Regiment) to be Quartermaster, with the honorary rank of Lieutenant, dated May 16, 1915.

3rd Northumbrian Field Ambulance.—John Steedman Horn, M.B., to be Lieutenant, dated May 9, 1915.

Northumbrian Casualty Clearing Station.—The date of appointment of Quartermaster and Honorary Lieutenant Frank C. Fletcher is August 12, 1914, and not as stated in the *London Gazette* of September 18, 1914; Captain William Simpson, from the 1st Northumbrian Field Ambulance, to be Captain, dated April 13, 1915; Major William A. Wetwan to be temporary Lieutenant-Colonel, dated May 12, 1915.

2nd East Lancashire Field Ambulance.—William Arthur Welch to be Transport Officer, with the honorary rank of Lieutenant, dated November 28, 1914.

3rd East Lancashire Field Ambulance.—Transport Officer and Honorary Captain Charles G. Stoddart, from 2nd East Lancashire Field Ambulance, to be Transport

Officer, with the honorary rank of Captain, dated August 5, 1914; Lieutenant Kingsmill W. Jones, M.D., to be Captain and to remain seconded, dated September 17, 1914; Lieutenant Frank G. Prestwich, from attached to Units other than Medical Units to be Lieutenant, dated May 26, 1915.

1st West Lancashire Field Ambulance.—Transport Officer and Honorary Lieutenant Robert M. Leonard resigns his commission, dated June 2, 1915.

2nd West Lancashire Field Ambulance.—Captain Walter L. Hawksley, M.B., to be temporary Major, dated April 14, 1915.

East Anglian Casualty Clearing Station.—Richard Vincent Slattery to be Lieutenant, dated April 20, 1915; James Mowat, M.B. (late Fleet Surgeon, Royal Navy) to be Major (temporary), dated April 29, 1915.

1st East Anglian Field Ambulance.—Lieutenant Laurence Henry Hutchins, from the 3rd East Anglian Field Ambulance, to be Lieutenant, dated May 26, 1915; Staff-Serjeant William Christopher Abbott, from 3rd East Anglian Field Ambulance, to be Quartermaster, with the honorary rank of Lieutenant, dated June 8, 1915.

2nd East Anglian Field Ambulance.—Lieutenant Arthur Edwin Tait, M.B., from 2nd Northumbrian Field Ambulance, to be Lieutenant, dated April 12, 1915; Captain Dudley William Boswell, M.D., to be temporary Major, dated April 29, 1915.

3rd East Anglian Field Ambulance.—The dates of appointment of the under-mentioned Lieutenants are as now stated, and not as announced in the *London Gazette* of April 6, 1915: Alexander Cuffe, M.D., F.R.C.S., dated February 19, 1915; Edward K. Goodwin, dated February 27, 1915; Albert Hall (late Serjeant-Major, Royal Army Medical Corps) to be Quartermaster, with the honorary rank of Lieutenant, dated May 12, 1915.

South Midland Casualty Clearing Station.—Walter Mundy Cox to be Lieutenant, dated April 29, 1915; Astley Bennett Prosser, M.B., to be Lieutenant, dated May 18, 1915; Captain James L. Joyce, F.R.C.S., is seconded, dated May 22, 1915.

North Midland Mounted Brigade Field Ambulance.—Arthur Avent (late Lieutenant of this Unit) to be Captain (temporary), dated April 17, 1915; Robert Hargreaves (late Cadet Serjeant, Cambridge University Contingent, Senior Division, Officers Training Corps) to be Lieutenant, dated May 17, 1915.

1st North Midland Field Ambulance.—Captain Frederick W. Johnson, M.B., from attached to Units other than Medical Units, to be Major (temporary), dated February 4, 1915.

2nd North Midland Field Ambulance.—Quartermaster and Honorary Captain Thomas Spibey is granted the honorary rank of Major, dated November 1, 1914; Alexander John Liddiard to be Transport Officer, with the honorary rank of Lieutenant, dated April 24, 1915; Major Richard M. West, M.D., to be temporary Lieutenant-Colonel, dated May 16, 1915; Captain Joseph F. Dixon, M.D., to be temporary Major, dated May 16, 1915.

3rd North Midland Field Ambulance.—James Edwin Wilson, M.D., to be Lieutenant, dated May 10, 1915.

1st West Riding Field Ambulance.—Lieutenant Herbert B. Pope, F.R.C.S., to be temporary Captain, dated May 2, 1915.

West Riding Divisional Sanitary Section.—Captain Cuthbert B. Moss-Blundell, M.D., from list of Sanitary Officers available on mobilization, to be Captain, dated June 2, 1915.

West Riding Casualty Clearing Station.—Major Louis P. Demetriadi, M.D., from attached to Units other than Medical Units, to be Lieutenant-Colonel (temporary), dated May 3, 1915.

Yorkshire Mounted Brigade Field Ambulance.—Captain Charles H. Bullen, M.D., from attached to Units other than Medical Units, to be Captain, dated November 30, 1914; Joseph Charles Denvir, M.B., to be Lieutenant, dated May 4, 1915; Captain and Honorary Major Alfred Hugh Benson, Retired List (late Royal Army Medical Corps (Militia), to be Captain (temporary), dated May 5, 1915.

ATTACHED TO UNITS OTHER THAN MEDICAL UNITS.

Lieutenant Hugh Paterson, M.B., to be Captain, dated August 10, 1914.

The date of appointment of Lieutenant Norman Maclaren, F.R.C.S., is October 17, 1914, and not as stated in the *London Gazette* of October 28, 1914.

Lieutenant Norman Maclaren, F.R.C.S., to be Captain, dated October 17, 1914.

Captain Norman Maclaren, F.R.C.S., to be Major, dated December 3, 1914.

Captain Arthur C. Bird, from the Territorial Force Reserve, to be Captain, dated January 14, 1915.

The date of appointment of Lieutenant Hugh D. McCrossan, M.B., is November 9, 1914, and not as stated in the *London Gazette* of January 14, 1915.

Major Robert J. R. C. Simons is seconded, dated January 9, 1915.

Temporary Captain John B. Bate, M.D., to be Captain, dated January 17, 1915.

William Joseph Lacy-Hickey, M.B., to be Lieutenant, dated February 19, 1915.

Samuel Shephard to be Lieutenant, dated March 10, 1915.

Edgar Babst, M.B. (late Lieutenant, 5th Battalion, Northumberland Fusiliers) to be Lieutenant, dated March 16, 1915.

John Kirkpatrick Brownlee to be Lieutenant, dated March 16, 1915.

Surgeon-Captain Alfred Robinson, M.D., from 5th Battalion, The York and Lancaster Regiment, to be Major, dated March 28, 1915.

George James Elliot Trotter to be Lieutenant, dated March 19, 1915.

Edward Peter Dawes to be Lieutenant, dated April 1, 1915.

Andrew Lowry McCully, M.B., to be Lieutenant, dated April 8, 1915.

Charles Beresford Alexander to be Lieutenant, dated April 14, 1915.

William Hall Calvert, M.D. (late Surgeon-Lieutenant, 1st Roxburgh and Selkirk (The Border Rifle and Volunteer Corps), to be Lieutenant, dated April 19, 1915.

Leonard Herbert Henry Boys to be Lieutenant, dated April 17, 1915.

Thomas Sprot Allan (late Surgeon-Lieutenant, 1st Volunteer Battalion, the Middlesex Regiment) to be Lieutenant, dated April 21, 1915.

Surgeon-Captain Evan J. T. Cory, M.D., from the 5th Battalion, The Welsh Regiment, to be Captain, dated April 22, 1915.

Richard Payne Pollard, M.B., to be Lieutenant, dated April 22, 1915.

Captain Haldinstein D. Davis is restored to the establishment, dated May 8, 1915.

Surgeon-Major Percival E. Barber, from West Riding Royal Horse Artillery, to be Major, dated May 14, 1915.

Lieutenant Isaac B. Bernstein resigns his commission, dated May 8, 1915.

William Appleyard (late Captain, 6th Battalion, The Prince of Wales's Own (West Yorkshire Regiment), to be Captain, dated May 16, 1915.

John David Jones (late Lieutenant, 4th Battalion, The Welsh Regiment) to be Lieutenant, dated May 16, 1915.

The date of appointment of Lieutenant Samuel Shephard is January 31, 1915, and not as stated in the *London Gazette* of May 17, 1915.

Lieutenant Cecil W. Rowntree, M.B., F.R.C.S., to be Captain, and to remain seconded, dated May 18, 1915.

Lieutenant Charles W. Wirgman, M.D., F.R.C.S., is seconded, dated May 18, 1915.

Surgeon-Major James P. S. Ward, from Devonshire Royal Garrison Artillery, to be Major, dated May 22, 1915.

David Alexander Ross Haddon, M.B. (late Lieutenant, 9th (Highlanders) Battalion, The Royal Scots (Lothian Regiment), to be Lieutenant, dated May 29, 1915.

Lieutenant John J. Porter, from 3rd Welsh Field Ambulance, to be Lieutenant, dated June 2, 1915.

Lieutenant George W. Mason resigns his commission on account of ill-health, dated June 2, 1915.

Surgeon-Major Arthur C. Oldham, from 2nd South Midland Brigade, Royal Field Artillery, to be Major, dated June 8, 1915.

Sanitary Service.—Alexander Gregor, M.D., to be Captain, whose services will be available on mobilization, dated May 29, 1915.

ROYAL ARMY MEDICAL CORPS OFFICERS' BENEVOLENT SOCIETY.

PROCEEDINGS OF THE ANNUAL GENERAL MEETING HELD IN THE LIBRARY OF THE ROYAL ARMY MEDICAL COLLEGE, AT 3 P.M., MONDAY, JUNE 14, 1915.

Present :—

Surgeon-General W. Donovan, C.B., in the Chair.

Colonel W. T. Martin.

Colonel H. W. Murray.

Colonel H. D. Rowan.

Lieutenant-Colonel A. B. Cottell.

Lieutenant-Colonel E. M. Pilcher, D.S.O.

- (1) The Minutes of the last meeting were read and confirmed.
 (2) The report of the Committee and the accounts for 1914 were considered and passed.
 (3) The following were elected Vice-Presidents for the ensuing year : Colonel J. Lane Notter, Colonel Sir James Clark, C.B., Bart., Surgeon-General M. W. Russell.
 (4) The Meeting sanctioned the following grants, recommended by the Committee, to applicants :—

Three orphans of Staff-Surgeon D. O. D.	£30
Orphan of Surgeon-Major C. Q.	30
Orphan of Inspector-General D. A.	30
Orphan of Surgeon-General A. S.	20
Orphan of Lieutenant-Colonel H. C.	25
Orphan of Surgeon-General J. O.	40
Orphan of Deputy Inspector-General W. F. I.	40
Orphan of Surgeon-General T. B.	40
Orphan of Surgeon-Major B. C. S.	30
Orphan of Major P. G. I. £30, and McGrigor's Pension £10	40
Three orphans of Captain G. C.	40
Orphan of Surgeon-General R. A. C.	25
Orphan of J. W. C., A.M.S.	20
Orphan Deputy Surgeon-General W. T. H.	20
Two orphans of Lieutenant-Colonel W. J. P.	10
Eight orphans of Lieutenant-Colonel J. W.	40
Orphan of Lieutenant-Colonel H. F. E.	10
Orphan of Captain T. S.	10
Two orphans of Captain H. D. O'C.	20
Two orphans of Captain E. M. G.	20
Orphan of Surgeon-General J. F.	30
Orphan of Surgeon-General J. M.	20
Orphan of Surgeon-Major W. P. F.	10
Orphan of Captain H. H. S.	10
Thirty-eight orphans.	
	<hr/> £610

- (5) The Meeting sanctioned a grant of £20 to the three orphans of Major P. G. H.
 (6) The following were elected to serve on the Committee for the ensuing year :—

Lieutenant-Colonel E. M. Pilcher, D.S.O.
 Colonel W. Horrocks, K.H.S.
 Lieutenant-Colonel A. B. Cottell.
 Colonel H. W. Murray.
 Lieutenant-Colonel E. M. Wilson, C.B., C.M.G., D.S.O.
 Surgeon-General Sir David Bruce, F.R.S., C.B.
 Colonel J. Murray Irwin.

F. W. H. DAVIE HARRIS, *Lieutenant-Colonel,*
 124, Victoria Street, S.W. *Secretary.*

REPORT OF THE COMMITTEE FOR THE YEAR 1914.

The number of subscribers for the year was 175.
 The total receipts amounted to £890 7s. 6d., of which £186 19s. 6d. was received from subscriptions.
 The total expenditure was £960 16s. 9d., which included the purchase of £150 Consols.
 Twenty-eight applicants, representing forty-three orphans, were granted £749 18s. 6d. in grants varying in amount up to £40.

ROYAL ARMY MEDICAL CORPS OFFICERS BENEVOLENT SOCIETY.

STATEMENT OF ACCOUNTS FOR THE YEAR 1914.

RECEIPTS.		£	s.	d.	EXPENDITURE.		£	s.	d.
To Balance in Bank, December 31, 1913	..	..	458	13 7	By Grants	..	..	..	..
" Subscriptions	..	..	186	19 6	" Auditors' Fees	..	..	..	749 18 6
" Rebate of Income Tax	..	..	..	..	" Bankers' Charges	..	..	..	..
" Dividends—	..	..	44	2 2	" Verification of Consols	..	..	..	..
North Eastern Railway 3 % Debenture Stock	..	..	..	..	" Secretarial and Office Expenses	..	..	..	..
(less tax £12 1s. 8d.)	..	..	187	17 10	" Stationery	..	..	..	90 0 0
London & North Western Railway 3 % Debenture Stock (less tax £11 17s. 6d.)	..	..	188	2 8	" Printing	..	..	..	2 12 5
Midland Railway 2½ % Debenture Stock (less tax £9 13s. 4d.)	..	..	150	6 8	" Postage	..	..	..	0 14 9
Caledonian Railway 4 % Debenture Stock (less tax £8 15s. 4d.)	..	..	104	8 8	" Purchase £150 Consols	..	..	..	2 9 8
Consols	..	..	28	10 2	" Balance in Bank, December 31, 1914	..	..	..	113 15 5
									383 4 6
				£1,344 1 3					

INVESTMENTS.		£	s.	d.
London & North Western Railway 3 % Debenture Stock	6,667	0	0	
North Eastern Railway 3 % Debenture Stock	..	6,666	0	0
Midland Railway 2½ % Debenture Stock	..	6,400	0	0
Caledonian Railway 4 % Debenture Stock	..	2,780	0	0
Consols	..	1,327	7	9
		£23,840	7	9

We have compared the above statement with the books and papers relating thereto, and certify that it is correct. We have verified the Bank Balance and the Investment in Consols, and have inspected the Certificate of the Investments in Railway Stocks as set out.

Portland House,
Basinghall Street, E.C.
January 7, 1915.

(Signed) EVANS, PEIRSON & CO.,
Chartered Accountants.

LIST OF SUBSCRIPTIONS FOR THE YEAR 1914.

Archer, Major S. A. ..	£0 10 6	Gatt, Capt. J. E. H. ..	£1 0 0
Alexander, Major J. D. ..	1 1 0	Gibson, Capt. H. G. ..	1 1 0
Birrell, Major E. T. F. ..	1 1 0	Gubbins, Surg.-Gen. W. L.,	
Babbie, Surg.-Gen. W., M.B.,		K.C.B., M.V.O. ..	1 1 0
V.C., C.B., C.M.G. ..	1 1 0	Goodwin, Major T. H. ..	1 1 0
Brodie, Lieut.-Col. J. F. ..	1 1 0	Hackett, Colonel R. J. D. ..	1 0 0
Buist, Major J. M., M.B. ..	1 1 0	Hamerton, Major A. E., D.S.O.	1 1 0
Beach, Lieut.-Col. T. B. ..	1 1 0	Hardy, Lieut.-Col. W. E. ..	1 1 0
Bourke, Surg.-Gen. G.D., C.B.	1 1 0	Herricks, Capt. H. ..	1 1 0
Balck, Major C. A. J. A. ..	1 1 0	Hall, Lieut.-Col. R. H. ..	1 1 0
Begbie, Major F. W. ..	1 1 0	Hassard, Lieut.-Col. C. M. ..	1 1 0
Browne, Capt. W. W. ..	1 1 0	Hughes, Capt. G. W. G. ..	1 1 0
Boyd, Capt. J. E. M. ..	1 1 0	Holyoake, Lieut.-Col. R. ..	1 1 0
Bent, Mrs. George ..	1 1 0	Horrocks, Col. W. H., K.H.S.	1 1 0
Blenkinsop, Lieut.-Col. A. P.	1 1 0	Harris, Lieut.-Col. F. W. H. D.	1 1 0
Bedford, Surg.-Gen. W. G. A.,		Hodgson, Major J. E. ..	1 1 0
C.M.G. ..	1 1 0	Harwood, Col. J. G. ..	1 1 0
Bewley, Lieut.-Col. A. W. ..	1 1 0	Hatheway, Surg.-Gen. H. G.,	
Clarke, Lieut.-Col. A. F. S. ..	1 1 0	C.B. ..	1 1 0
Campbell, Major J. H., D.S.O.	1 1 0	Heale, Lieut. A. S. ..	1 1 0
Churchill, Surg.-Gen. A. F. ..	1 0 0	Hyde, Major D. O. ..	1 1 0
Cree, Lieut.-Col. H. E. ..	1 1 0	Hayes, Capt. A. H. ..	1 1 0
Cottell, Lieut.-Col. A. B. ..	1 1 0	Howley, Major H. E. ..	1 1 0
Corker, Surg.-Gen. T. M. ..	1 0 0	Harding, Major D. L. ..	1 1 0
Chambers, Major A. J. ..	1 0 0	Irwin, Col. J. M., M.B. ..	1 1 0
Cummins, Major S. L. ..	1 1 0	Jennings, Col. R., M.D. ..	1 0 0
Chopping, Major A. ..	1 1 0	Johnston, Col. W., M.D., C.B.	1 1 0
Churchill, Capt. G. B. F. ..	1 1 0	James, Col. H. E. R. ..	1 1 0
Cochrane, Major E. W. ..	1 1 0	Jones, Col. F. W. C. ..	1 1 0
Cuffe, Surg.-Gen. Sir Charles	1 1 0	Jones, Col. J. M. ..	1 1 0
Clapham, Capt. J. T. ..	1 1 0	Jameson, Major J. C. ..	1 0 0
Connor, Major J. C. ..	1 1 0	Jameson, Major A. O. ..	1 1 0
Copeland, Lieut.-Col. R. J. ..	1 1 0	Julian, Lieut.-Col. O. R. A.	1 1 0
Chapman, Capt. F. H. M. ..	1 1 0	Kirkpatrick, Col., M.D., C.M.G.	1 1 0
Clark, Col. Sir James, C.B.,		Knox, Lieut.-Col. M. ..	1 0 0
Bart. ..	1 1 0	Keogh, Surg.-Gen. Sir A.,	
Carruthers, Capt. V. T. ..	1 1 0	M.D., K.C.B. ..	1 1 0
Casement, Capt. F. ..	1 1 0	Kenny, Surg.-Gen. W. ..	1 1 0
Cowen, Lieut. E. G. H. ..	1 1 0	Kelly, Capt. W. D. C. ..	1 1 0
Conyngham, Capt. C. A. T. ..	1 1 0	Longmore, Lady ..	1 0 0
Cumming, Major C. O. ..	1 1 0	Lane, Lieut.-Col. W. L., M.B.	1 1 0
Davies, Lieut.-Col. A. M. ..	1 1 0	Leake, Col. G. D. N. ..	1 1 0
Donovan, Surg.-Gen. W., C.B.	1 1 0	Lelean, Major P. S. ..	1 1 0
Evatt, Surg.-Gen. J. G. H., C.B.	1 0 0	Long, Major H. W. ..	1 1 0
Evans, Major P. ..	1 1 0	Lunn, Capt. Wm. C. E. ..	1 0 0
Elkington, Lieut.-Col. H. P. G.	1 1 0	Langrishe, Capt. J. du P. ..	1 1 0
Ellis, Surg.-Gen. P. M. ..	1 1 0	Loughnan, Capt. W. F. M. ..	1 1 0
Fitzgerald, Major A. A. ..	1 1 0	Lynden-Bell, Col. H. L. ..	1 1 0
Firth, Col. R. H. ..	1 1 0	Martin, Col. W. T. ..	1 1 0
Foulds, Major F. M. ..	1 1 0	MacLaughlin, Major A. M. ..	1 1 0
Fletcher, Lieut.-Col. H. J. ..	1 1 0	Macpherson, Surg.-Gen. W. G.,	
Fayle, Lieut.-Col. R. J. ..	1 1 0	M.B., C.M.G. ..	1 1 0
Faichnie, Lieut.-Col. N. ..	1 0 0	Mould, Lieut.-Col. W. T. ..	1 1 0
Forrest, Major J. V. ..	1 1 0	Murray, H. W., M.B. ..	1 1 0
Fell, Major W. H. G. ..	1 1 0	McGill, Col. H. S. ..	1 1 0
Giraud, Surg.-Major-Gen. C. H.	1 1 0	May, Col. W. A., C.B. ..	1 1 0
Green, Lieut.-Col. J. S., M.B.	1 1 0	McNamara, Surg.-Gen. W. H.,	
Gerrard, Lieut.-Col. J. J., M.B.	1 0 0	C.B. ..	1 1 0
Goggin, Colonel G. T. ..	1 0 0	McSheehy, Surg.-Major E. L.	1 1 0
Geddes, Lieut.-Col. R. J., D.S.O.	1 1 0	Mangin, Major F. M. ..	1 1 0
Galwey, Capt. R. W. ..	1 1 0	McDougall, Major A. J., M.B.	1 1 0

LIST OF SUBSCRIPTIONS—*contd.*

Mackenzie, Major T. C., D.S.O. £1 1 0	Stallard, Major H. C. F. .. £1 0 0
MacLoughlin, Lieut.-Col. G. S., M.B., D.S.O. .. 1 1 0	Sewell, Capt. E. P. .. 1 1 0
Martin, Major C. B. .. 1 1 0	Skinner, Col. Bruce, M.V.O. ... 2 0 0
Morris, Major A. H. .. 1 1 0	Sloggett, Surg.-Gen. Sir A. F., C.B., C.M.G. .. 1 1 0
McEwen, Capt. O. R. .. 1 1 0	Staddon, Major H. E. .. 1 1 0
Mosse, Col. C. G. .. 1 1 0	Steel, Major E. B. .. 1 1 0
Mackenzie, Capt. D. F. .. 1 0 0	Stephens, Major F. A. .. 1 1 0
Maher, Col. J. ... 2 0 0	Smith, Major S. Beylan .. 1 1 0
Myles, Major C. D. .. 1 0 0	Sim, Capt. J. A. B. .. 1 1 0
MacNeece, Surg.-Gen. J. G., C.B. 1 1 0	Stack, Capt. H. J. .. 1 1 0
Macdonald, Lieut.-Col. C. J. 1 1 0	Spence, Lieut. B. H. H., M.B. 1 1 0
Notter, Col. J. Lane .. 1 0 0	Trevor, Surg.-Gen. Sir W., M.B., C.B., K.C.I.E. .. 1 0 0
Nash, Lieut.-Col. L. T. .. 1 1 0	Townsend, Surg.-Gen. Sir C.
Pocock, Lieut.-Col. H. .. 1 0 0	Tatham, Lieut.-Col. C. J. W. 1 1 0
Profeit, Major C. W. .. 1 1 0	Trevor, Col. H. O. .. 1 1 0
Porter, Col. R. ... 1 1 0	Thompson, Capt. W. I. .. 1 1 0
Poynder, Lieut.-Col. G. F. .. 1 1 0	Vivian, Capt. R. T. ... 1 1 0
Paterson, Major Ian .. 1 1 0	Vaughan, Capt. E. W. .. 1 1 0
Phelan, Capt. E. C. .. 1 1 0	Windle, Lieut.-Col. R. J. .. 1 1 0
Pilcher, G. M., D.S.O. .. 1 1 0	Wardrop, Col. W. M. M., C.V.O. 1 1 0
Risk, Col. E. J. E. .. 1 1 0	Williamson, Lieut.-Col. J. G. 1 1 0
Rowan, Lieut.-Col. H. D., M.B. 1 1 0	Woodhouse, Surg.-Gen. T. P. 1 1 0
Russell, Lieut.-Col. M. W. .. 1 1 0	Whitehead, Surg.-Gen. H. R., C.B. .. 1 1 0
Rugg, Capt. G. F. .. 1 1 0	Waring, Major A. D. .. 1 1 0
Reilly, Lieut.-Col. C. C. .. 1 0 0	Watts, Major B. ... 1 1 0
Robinson, Major F. E. R. .. 1 1 0	Wilson, Lieut.-Col. E. M., C.E., C.M.G., D.S.O. .. 1 1 0
Ritchie, Capt. M. B. H. .. 1 1 0	Winder, Capt. M. G. .. 1 1 0
Roch, Major H. S. .. 1 1 0	Whipple, Col. J. H. C. .. 2 2 0
Rutherford, Major N. J. C. .. 1 1 0	Wood, Capt. J. L. .. 1 1 0
Sinclair, Depy. Surg.-Gen. C. M., C.B. ... 1 1 0	Young, Major A. H. O. .. 1 1 0
Smithson, Major A. E. .. 1 1 0	
Symons, Lieut.-Col. J. T. M. 2 0 0	

ROYAL ARMY MEDICAL CORPS FUND.

THE thirteenth Annual General Meeting of the Royal Army Medical Corps Fund, held at the Royal Army Medical College on Monday, June 14, 1915; Surgeon-General Sir David Bruce, C.B., F.R.S., in the Chair.

(1) REPORT OF THE COMMITTEE.

The Committee undertakes with the assistance of various sub-committees, the management and administration of the Royal Army Medical Corps Fund. The Corps Fund embodies the Dinner, the Band and the Memorials, also the General Relief Fund and the Compassionate School Fund.

Committee.—The Committee consists of thirteen members, nine taken from the Active List, who are all *ex officio*, and four representatives of retired pay officers who are elected by the Committee from time to time as vacancies occur and hold office for four years. The *ex-officio* members hold office for the tenure of their appointments. During the past year Surgeon-General M. W. Russell has replaced Surgeon-General Macpherson, Surgeon-General Sir David Bruce has succeeded Colonel Skinner, and Colonel Peterkin has taken the place of Colonel Lynden Bell.

Accounts.—The accounts are made up to December 31 yearly, and after audit are considered and passed by the January Committee Meeting and published in the February CORPS NEWS.

On June 1 last the finances of the Fund stood as follows :—

	£	s.	d.
R.A.M.C. Fund current account	588	16	1
" " deposit " 	800	0	0
" " investments 	2,865	0	0
	<hr/>		
	£4,253	16	1
General Relief Fund current account	315	10	3
" " " deposit " 	600	0	0
" " " investments 	1,666	6	8
	<hr/>		
	£2,581	16	11
Compassionate School Fund current account ..	23	1	2
" " " deposit " 	300	0	0
	<hr/>		
	£323	1	2

Subscribers.—The number of subscribers for 1914 was 1,114, as compared with 1,116 the previous year. As stated at the Annual Meeting last year there were a large number of officers on the Active List who did not subscribe, but in response to a circular letter sent out by the Committee, this number has now been considerably reduced.

Band.—During the year 1914, £320 was sanctioned by the Committee and paid out of the Royal Army Medical Corps Fund towards the expenses of the Band. This is nearly £100 less than was paid the previous year, owing to the War taking all our bandmen abroad. The Committee have sanctioned the pay of the Bandmaster to continue until the end of the present year, when the question of retaining his services will be again considered. The only other expense now being incurred is that of a shilling per day to the N.C.O. who looks after the Band instruments.

Dinner.—The Fund paid £315 8s. 4d. towards the Dinner of last year. This year there will be no Dinner owing to the War.

Memorials.—Surgeon-General Russell and Surgeon-General Sir David Bruce have succeeded Surgeon-General Macpherson and Colonel Skinner on the Memorial Sub-Committee and Colonel Peterkin has taken the place of Colonel Lynden Bell. Besides the usual Memorial subscriptions the following amounts were expended :—

	£	s.	d.
Portraits and Engravings	10	8	0
Donation to the Fund for the Preservation of the Battlefield of Waterloo	26	5	0

The usual Memorial subscriptions are Royal School, Bath, twenty-five guineas, and Queen Alexandra's Military Hospital Chapel Memorials Insurance, £4 6s. 6d.

General Relief Fund.—During the year 1914, £243 12s. was received in grants from Companies, also a donation of £42 from the Town and Counties Medical Club, Glasgow; this sum has been ear-marked at the request of the donors for cases of distress arising out of the War. The sum of £104 was expended in grants to Companies; the decrease of amount in this expenditure compared with the previous year is due to the fact that since the outbreak of the War all cases of distress amongst the N.C.O.s and men now serving, including reservists, were directed to apply for relief to the Soldiers' and Sailors' Families Association, and it is only the application of cases unconnected with the War that are now being dealt with by us.

This Fund, besides granting relief to cases of distress recommended by officers commanding Companies, pays all the Corps subscriptions for the rank and file, such as The Union Jack Club, Corps Commissionaires, Soldiers' and Sailors' Help Society, Army and Navy Male Nurses' Co-operation, National Association for the Employment of ex-Soldiers.

This meeting has for several years past voted a grant from the Royal Army Medical Corps Fund to the General Relief Fund; you will be asked to do so again this year.

Compassionate School Fund.—This gradually decreasing fund paid £74 last year towards the maintenance of some of our children at schools. It has now about £320 remaining. Its only receipt is that derived from interest of money we have on deposit, and that also is yearly becoming less. This fund now provides for nine children.

Last year this meeting referred to the Committee for the report, the question of a

request from Colonel Johnson, C.B., for a grant towards the expenses of the publication of a work on which he was engaged in writing, namely a "History of the Corps." Owing to the lamented decease of this officer, the Committee were not, until very lately, able to obtain full details or particulars from the executors. The Secretary has recently received a letter from Mrs. Johnson, saying that the publication of the work will cost fully £500, of which sum she is prepared to guarantee £250, and it is expected at least 100 guineas will be received from subscribers at 1 guinea each. Mrs. Johnson says that it would be extremely kind of the Royal Army Medical Corps Fund if they can see their way towards helping with the expenses of the publication.

The Secretary, Lieutenant-Colonel Davie Harris, read the report of the Committee, which was carried.

(2) The next item on the Agenda was then proceeded with, which was to consider the question of giving a grant towards the expenses of publication of Colonel Johnston's book. The Secretary read letters which he had received from Surgeon-General Macpherson and Mrs. Johnston with regard to making a grant towards the publication of same. After a short discussion Colonel Cottell proposed that £100 be given towards the publication, and this was seconded by Colonel Rowan. After further discussion, however, it was thought that a larger amount should be given, and Colonel Murray proposed that the sum of £150 should be given instead of £100 towards the publication. This was seconded by Colonel Pilcher, and was carried.

(3) The Chairman: We now come to No. 3 on the Agenda, that is, to vote a grant to the General Relief Fund.

Colonel Murray said he would like to say a few words on this matter. For the past few years Colonel Wilson has proposed an extra amount every year and I think as years went on he would ask for the fund to give a larger subscription. Owing to the War there is likely to be a greater demand from the General Relief Fund. I think we might go a step further and contribute a little more. We are likely to have a lot of men injured, therefore I should feel inclined to propose that we give £10 or £20 more, if we can afford it.

Colonel Harris: We can afford it.

It was then proposed by Colonel Murray and seconded by Colonel Cottell that the sum of £80 be given to the General Relief Fund. This was carried.

The Chairman: We now come to the next item, re-appointing Auditors for the ensuing year. Colonel Julian and Colonel Wilson have kindly audited our accounts for the past two years. We have one auditor on the Active List and one on the Retired List. On the proposition of the Chairman, Colonel Wilson and Colonel Julian were re-elected.

This completed the business of the meeting.

OLD ETONIANS IN THE R.A.M.C.

MR. E. VAUGHAN, "The Marches," Willowbrook, Eton, will be glad if any old Etonian serving in the Royal Army Medical Corps will communicate with him, giving details of rank in the Service and Eton house.

DEATHS.

FERGUSON.—Brigade Surgeon Lieutenant-Colonel Frederick Ferguson, M.D. (Retired), Army Medical Staff, died at Camberwell House Asylum, Peckham Road, Surrey, on March 10, 1915, aged 74.

McCULLOCH.—Lieutenant-Colonel Thomas McCulloch, M.B., R.A.M.C., died at Queen Alexandra, Portsmouth, on June 25, 1915, aged 54.

ROSE.—Honorary Deputy-Surgeon-General Henry Joseph Rose, retired Medical Department, died at 3, Mandeville Place, London, on June 2, 1915, aged 82.

SLADEN SHIELDS.—Lieutenant Hugh John Sladen Shields, M.B., R.A.M.C., died in Belgium on October 26, 1914, of wounds received in action, aged 27.

TREWMAN.—Lieutenant-Colonel George Turner Trewman, M.B. (Retired pay), late R.A.M.C., died at Reading on June 13, 1915, aged 59.

EXCHANGES, &c.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd., 8, Serle Street, London, W.C., not later than the 22nd of the month.

A free issue of twenty-five reprints will be made to contributors of Original Communications, and of twenty-five excerpts of Lectures, Travels, and Proceedings of the United Services Medical Society.

* Any demand for excerpts, additional to the above, or for reprints, must be forwarded at the time of submission of the article for publication, and will be charged for at the following rates, and additional copies at proportionate rates:—

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12	4	£ s. d.	£ s. d.	s. d.	s. d.	s. d.	s. d.
	8	0 2 6	0 1 0	3 6	0 11	3 2	0 7
	16	0 4 6	0 2 0				
25	4	0 7 6	0 3 6	4 0	1 3	3 6	0 9
	8	0 3 0	0 1 3				
	16	0 5 6	0 2 6				
50	4	0 9 6	0 4 6	5 0	1 9	4 0	1 0
	8	0 4 0	0 1 8				
	16	0 6 9	0 3 2				
100	4	0 12 0	0 5 3	6 6	3 3	5 6	2 0
	8	0 5 6	0 2 9				
	16	0 9 0	0 4 4				
200	4	0 16 9	0 6 9	9 0	6 3	7 6	4 0
	8	0 8 6	0 4 0				
	16	0 13 6	0 6 0				
		1 3 6	0 8 9				

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Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

All such Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the Author notifies at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," War Office, Whitehall, London, S. W.

Communications have been received from Colonel R. H. Firth, Captain J. H. Douglas, Major D. Embleton, Captain E. A. Peters, Lieutenant-Colonel A. E. Weld, Lieutenant E. F. Burke, Lieutenant A. Abrahams, Lieutenant J. Elliott Black, Lieutenant E. T. Glenny, Lieutenant J. W. McNee, Colonel Sir Wilmot Herringham, Major E. G. Ffrench, Lieutenant H. Mold, Captain G. Tabuteau.

The following publications have been received :—

British : The Journal of Tropical Medicine and Hygiene, The Medical Review, Guy's Hospital Gazette, The St. Thomas's Hospital Gazette, Proceedings of the Royal Society of Medicine, The Medical Press and Circular, The Middlesex Hospital Journal, Tropical Diseases Bulletin, Red Cross and Ambulance News, The Royal Engineers' Journal, The Practitioner, St. Bartholomew's Hospital Gazette, The Indian Medical Gazette, Medical Journal of Australia, The Lancet, The Hospital, Public Health, Transactions of the Society of Tropical Medicine and Hygiene, The Sanitary Record and Municipal Engineering, The Medical Journal of South Africa, The Journal of State Medicine, Report on the Royal Military College of Australia, 1918-1914.

Foreign : Office International d'Hygiène Publique, Bulletin of the United States Department of Agriculture, Bulletin de la Société de Pathologie Exotique, Bulletin de l'Institut Pasteur, Annali di Medicina Navale e Coloniale, Revista de Sanidad Militar, Bulletin of the Johns Hopkins Hospital, Le Caducée.

MANAGER'S NOTICES.

The **JOURNAL OF THE ROYAL ARMY MEDICAL CORPS** is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

The Annual Subscription is £1 (which includes postage), and should commence either on 1st July or 1st January; but if a subscriber wishes to commence at any other month he may do so by paying for the odd months between 1st July and 1st January at the rate of 1s. 8d. (one shilling and eightpence) per copy. (All subscriptions are payable in advance.)

Single copies can be obtained at the rate of 2s. per copy.

The Corps News is also issued separately from the Journal, and can be subscribed for at the rate of 2s. (two shillings) per annum, including postage. Subscriptions should commence from 1st July each year; but if intending subscribers wish to commence from any other month, they may do so by paying for the odd months at the rate of 2d. per copy. (All subscriptions are payable in advance.)

Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager, "Journal of the Royal Army Medical Corps," War Office, Whitehall, London, S.W., and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

It is requested that all Cheques or Postal Orders for Subscriptions to the Journal, Corps News, Reprints, etc., be crossed "Holt & Co.," and made payable to the "Hon. Manager, Journal R.A.M.C.," and not to any individual personally.

All communications for the Hon. Manager regarding subscriptions, etc., should be addressed to

THE HON. MANAGER,
"JOURNAL OF THE ROYAL ARMY MEDICAL CORPS,"
WAR OFFICE, WHITEHALL, S.W.

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS.

Corps News.

APRIL, MAY AND JUNE, 1915.

ARMY MEDICAL SERVICE.

Major Ernest C. Freeman, M.D., Reserve of Officers, from Deputy Assistant Director of Medical Services, to be Assistant Director of Medical Services, East Anglian Division, with the rank of Colonel, dated April 20, 1915.

Lieutenant-Colonel (local Colonel) Richard R. Sleman, M.D., Royal Army Medical Corps, Territorial Force, to be temporary Colonel whilst employed as Deputy Director of Medical Services at Malta, dated May 15, 1915.

Temporary Lieutenant-Colonel Charters J. Symonds, M.D., F.R.C.S., from Royal Army Medical Corps, to be temporary Colonel, dated June 13, 1915.

The undermentioned Officers, Royal Army Medical Corps, Territorial Force, to be temporary Colonels :—

Dated June 13, 1915.—Major A. H. Tubby, M.B., F.R.C.S. ; Captain V. W. Low, M.D., F.R.C.S. ; Captain J. P. Stewart, M.D., F.R.C.P.

ROYAL ARMY MEDICAL CORPS.

The undermentioned Serjeant-Majors to be Quartermasters with the honorary rank of Lieutenant :—

Dated April 13, 1915.—Ernest Henry Rossiter ; James Thomas Starkie ; Edward Kerstein ; Thomas Connolly ; Robert Ernest Manwaring ; John Enwright ; John Wingfield Willsher ; George Sellex ; Benjamin Disraeli Conolly ; Hugh William Rose.

Lieutenant-Colonel David L. Hamilton, F.R.C.S. Edin., from 2nd Home Counties Field Ambulance, to be Deputy Assistant Director of Medical Services, Home Counties Division, dated May 12, 1915.

Major S. Berkeley G. A. Moynihan, Kt., M.B., F.R.C.S., Royal Army Medical Corps, Territorial Force, to be temporary Lieutenant-Colonel, dated June 10, 1915.

Bernhard Ehrenfried Myers, M.D., to be temporary Major whilst serving with the New Zealand Auxiliary Hospital, dated June 22, 1915.

Alexander Johnstone, M.D., to be temporary Major, dated May 27, 1915.

Temporary Lieutenant Thomas Kay, M.B., Major Royal Army Medical Corps, Territorial Force, to be temporary Major, dated June 24, 1915.

Captain Charles S. Myers, M.D., to be temporary Major, dated March 28, 1915.

Captain William McConaghy is seconded for service with the Egyptian Army, dated June 5, 1915.

The undermentioned to be temporary Captains :—

Dated May 1, 1915.—Arthur George Whitehorne-Cole.

Dated May 22, 1915.—Walter Sydney Lazarus-Barlow, M.D.

Dated June 1, 1915.—James Walker Beattie, M.D.

Dated June 24, 1915.—Temporary Lieutenant Harold Wiltshire, M.D.

Temporary Lieutenant Vivian P. Foote relinquishes his commission on account of ill-health, dated June 15, 1915.

Dated June 11, 1915.—Temporary Captain Sydney G. L. Catchlove, M.B., relinquishes his commission.

Dated June 8, 1915.—Benjamin Thomas Edye, M.B., to be temporary Captain whilst serving with the Australian Hospital.

The undermentioned to be temporary lieutenants:—

Dated April 20, 1915.—Francis William Stone, M.B.; Frank Harold Looney, M.B.; Arthur Ernest Stenning, M.B.; Michael Harold Sorokiewich, M.B.; Robert Welton Hogg, M.B.; Johnston Hughston, M.B.; Charles Humphrey Lloyd, M.B.; Cecil Gordon McAdam, M.B.; Roy Baldwin Minnett, M.B.

Dated May 1, 1915.—William Moore Skipwith Robinson.

Dated May 10, 1915.—John Joseph Middleton, M.B.

Dated May 13, 1915.—Dominic John Cannon, M.B.

Dated May 20, 1915.—Samuel Lloyd Corry, M.B.; Malcolm Macnicol, M.D.; Percy Templeton; Edgar Roe Lyth, M.B.; Stephen Galt Trail, M.B.; Frank Melville Harvey; Tudor Benson Evans, M.B.

Dated May 21, 1915.—Ellis Gordon Goldie, M.D.; James Murray Duff Mitchell, M.D.; George Peter Taylor, M.B.; Edmond Ryan; John Charles Michell; John Low, M.B.; Edward Beresford Collings; Albert Edward Blackburn, M.D.; Francis Anderson, M.B.; John Anderson, M.B.; James Montgomery Anderson, M.D.; Edward Scott White; Thomas Trevor Apsimon, M.B.; Maurice Aloysius Power, M.B.; Henry Clendinning Davison, M.D.; John Clark, M.B.; William O'Brien, M.B.; Thomas Kirkwood, M.B.; Allen Edgar Thompson, M.D.; Augustus Beauchamp Northcote, M.D.; James Samuel Richard Weir; Robert Charles De Lacey, M.B.; Henry Richard Hurry; Claude Robinson Lucas.

Dated May 22, 1915.—Frederick William Waudby Griffin, M.D.; Alexander Newton Clemenger; Daniel Charles Evans; Herbert Frank Willington; Lieutenant Ronald Russell Scott, M.B., Canadian Army Medical Corps.

Dated May 24, 1915.—Israel Allaun; James Lawson Williams, M.D.; William Henry Warwick, M.B.; Roy Darley Clayton; Gerald Henry Davy, M.B.; Frank Ernest Reynolds; Charles Brehmer Heald, M.D.; Wilfred Richard Matthews.

Dated May 25, 1915.—James Cunningham, M.B.; Lancelot Gordon McCune, M.B.; Bernard Geoffrey Klein, M.D.; James Davidson MacKay, M.B.; Henry Donald Welpy, M.B.; William Taylor Buchan, M.B.; Ernest Coleman, M.B.; Robert James Allsopp, M.B.; John Gordon Smith Macpherson, M.B.; John Proctor, M.B.; Donald McIntyre, M.B.; David Charles Welsh, M.B.; Arthur Leslie Walters; William Ledingham Christie, M.D., F.R.C.S.; John Lyn Dimond, M.B.; Dan Arthur Powell; Arthur Edward Clarke; Robert Hugh Drennan, M.B.; Wilfred Angel Easton; Arthur Noel Houghton, M.B.; Herbert Playford Sheppard, M.B.; Raymond Alexander Hannay Atkinson, M.B.; Allan Massey, M.B.; William Rice Meredith; Francis Joseph Sadler, M.D.; Spencer Churchill, M.B.; Douglas Allan; Sydney Joseph Smith.

Dated May 26, 1915.—Watts Edmondson; Charles Salkeld, M.B.; Arthur John Clayton; John Keble Milne Dickie, M.D., F.R.C.S. Edin.; Hew William Scott-Wilson, M.B.; Arthur Geoffrey Shera, M.B.

Dated May 27, 1915.—Arthur Edward Lyster, M.D.; James Lochhead Gregory, M.B.; Lester Ernest Ashley Emile; William Minty Badenoch, M.B.; Richard Nunn, M.D.; Sidney Winslow Woollett; Thomas Hutchinson; Andrew Philip, M.D.; Nelson West Jenkin; Adam Brown, M.B.; Arthur James Lewis, M.D.; Hugh James McCurrick; Charles Samuel Woodd; William Edward Nickolls Dunn, M.B.; Patrick Aloysius Doyle; Kirsop Bainbridge James Vickers, M.B.; George Brown Crawford, M.D.; David Fettes, M.B.; Barron Norman Sinclair, M.B.; James Leslie Callaghan; William Hunter Brown, M.B.

Dated May 28, 1915.—Arthur Hill Laird, M.B.; Malcolm Mauseon, M.B.; Harold Willis Scawin; Robert Scott, M.B.; Mark O'Brien; Kenneth Fraser, M.D.; Leslie Gordon Tait, M.B.; George Kirkwood Allan, M.B.; James Henderson Yule, M.B.; John Alexander Mortimer, M.D.; William Duncan Lawrie, M.D., F.R.C.S. Edin.; William Sibbald Campbell, M.D.; Norman Alexander Aylmer Hughes; Douglas Craig, M.D.; Percy Charles Garrett; Leslie Wilson Evans, M.B.; Reginald Norman Porritt; David Watt Torrance, M.D.; Reginald Inglis Douglas, M.B.; John Barron Scott, M.B.; James Finlay Alexander, M.D.; Huntley Gordon Hyde Cowell.

Dated May 29, 1915.—Thomas Joseph Lydon, M.B.; Frederick William Campbell; Andrew Louis Krogh, M.B.; Paul Ransome Browning.

Dated May 31, 1915.—William Johnston Symes, M.B.; Robert Brookes; Michael Abdy Collins, M.D.

Dated June 1, 1915.—James Renfrew White, M.B.; Joseph Jopling Brown, M.B., F.R.C.S.Edin.; Maberley Squire Esler; William John Patterson, M.B.; Donald George Macleod Munro, M.D.; Frederick George Gibbs; John Lindesay Pearce, M.B.; Oswald John William Adamson; George Spencer Armitage Bishop, M.B.; James O'Dowd Egan; Claude Alfred Heath Gee, M.B.; Robert Cunyngham Brown, M.D.; William George Southey, M.B.; Felix Arthur Kerr, M.B.; George Alexander Pringle, M.D.; Bartholomew Langran; Robert Philip Garrow, M.D.; George Barton McCaul, M.D.; Patrick Gerald Tuohy, M.B.; John Richard Rygate; Francis Garland Collins; Andrew Blair Aitken, M.D., F.R.C.S.; Reginald Ambrose Facey; Henry Saunders; Butler Hogan; Robert Rutherford, M.B.; Robert Daniel Bridger; Thomas George Stevens, F.R.C.S.I.; John George Garson, M.D.; Samuel Greenwood; Dan Tenison; Donald Carmichael Thomas; Charles Jerome Tisdall, M.B.; John Joseph Gibb, M.B.; William Robinson, M.B.; Francis William Garrad, M.D.; Hugh Roker Evans, M.D.; Malcolm William Stewart-Smith, M.B.; Hugh McMillan Donaldson, M.B.; Alfred Vellar, M.B.; George Younger Richardson, M.D.; Frederick James Dixon, M.B.; John Wright, M.B.; Francis Gerrard Hamilton Cooke; Archibald Stevenson, M.D.; John Alexander Wilson, M.B.; Hugh Charles Mary McManus, M.B.; Leonard Horner Bryson, M.D.; Henry MacCormac, M.B.; Harold Herbert Tanner, M.B.; John Young, M.B.; Donald Mackinnon, M.B.; William Kelman MacDonald, M.D.; George Edwin Davidson, M.B.; Leslie Valentine, M.B.; Francis Heatherley, M.B., F.R.C.S.; John Crighton Bramwell, M.B.; Cecil William Bond; Cyril Searle Gideon; James Charles McWalter, M.B.; Leander Lowrie Fyfe, M.B.; Olliver Bruce; Charles Wolfe Hamilton, M.D.; Algernon Meyrick Alban James; William Leslie Hay; John Lewis Anderton Grout; Arthur Trower; Joseph Hambley Rowe, M.B.; Edmund Neptune Russell, M.B.; Arthur Carlile Sturdy, F.R.C.S.; Thomas George Smith Hodson, M.D.; James Laird, M.B.; Francis McKee, M.B., F.R.C.S.I.; Theodore John Phillips, M.B.; Alan Murdoch; William Enraght; John Geddes Scott; George Eric Beggs.

Dated June 2, 1915.—Andrew Cochrane, M.B.; Murtaugh James Houghton; Percy William Moore, M.B.; Vincent Frederick Lennane; Richard Lewis.

Dated June 3, 1915.—Herbert George Willis, M.B.; William George Brett; Gerald Septimus Samuelson, M.D.; Thomas Heywood, M.D.; Charles Vivian Cornish, F.R.C.S.Edin.

Dated June 4, 1915.—Percy Stanley Hopkins; James Russell, M.D.; Hugh Michael Collins.

Dated June 5, 1915.—Oliver Eaton; James Harvey Cuthbert, M.B.; Meyer Cohen, M.D.; Temporary Honorary Lieutenant Hugh Leonard Burton, M.B.

Dated June 14, 1915.—Arthur Conyers Inman, M.B.
Ernest Frederic Eliot, F.R.C.S.Edin., is granted temporarily the honorary rank of Major, dated June 24, 1915.

Frederick George Lovell to be temporary Quartermaster, with the honorary rank of Lieutenant, dated June 8, 1915.

The undermentioned temporary Lieutenants, having ceased duty with British Red Cross Hospital, Netley, relinquish their commissions:—

Dated May 24, 1915.—Moberly S. Esler.

Dated June 8, 1915.—Donovan B. Pascall.

William Marchant Muddell to be temporary Quartermaster, with the honorary rank of Lieutenant, dated June 11, 1915.

Frederick Gate to be temporary honorary Quartermaster, with the honorary rank of Lieutenant, whilst employed at the Bagthorpe War Hospital, dated June 26, 1915.

Frederick Hall, M.B., to be temporary honorary Lieutenant whilst serving with the St. John Ambulance Brigade Hospital, dated June 10, 1915.

Ralph Marsh de Mowbray to be temporary Lieutenant whilst serving with the British Red Cross Hospital, Netley, dated April 27, 1915.

The undermentioned Non-Commissioned Officers and men of the Canadian Army Medical Corps to be temporary Lieutenants:—

Dated June 2, 1915.—Corporal Ernest Lachopelle, M.B.

Dated June 4, 1915.—Staff-Serjeant George Frederick Laing, M.B.; Serjeant Robert Stanley Armour, M.B.; Serjeant Phillippe Belanger, M.B.; Serjeant John Ranson Howitt, M.B.; Serjeant Otto de Muth, M.D.; Serjeant Cecil Darling Kean, M.D.; Serjeant Harold Francis Hope Eberts, M.D.; Private Albert Davis Sharp, M.D.; Private Harold Clifford Wert, M.D.; Private Lee Smith, M.D.; Private Cecil Owen

Walsh, M.D.; Private Francis Sharpe Walcott, M.D.; Private Frederick Russell Kirkham, M.B.; Private Benjamin Franklyn Macnaughton, M.D.; Private William Templeman, M.D.; Private Lavell Hall Leeson, M.D.; Private Irving Daniel Ramsay, M.D.

Lieutenant Fraser Baillie Gurd, M.D., Canadian Army Medical Corps, dated June 5, 1915.

James Wilcocks to be temporary Quartermaster, with the honorary rank of Lieutenant, dated June 7, 1915.

WARRANT OFFICERS, NON-COMMISSIONED OFFICERS, AND MEN.

DISTINGUISHED CONDUCT MEDALS.

His Majesty the King has been graciously pleased to approve of the award of the Distinguished Conduct Medal to the undermentioned Non-commissioned Officers and men for acts of gallantry and devotion to duty.

(Supplement to the *London Gazette*, No. 29117, dated March 30, 1915.)

No. 8313 Private J. W. Foulkes.

For gallant conduct in the performance of his duties, collecting the wounded whilst under fire.

No. 641 Private G. Hill (S.R.).

For gallant conduct on many occasions, especially at Neuve Chapelle, where he showed a fine example of devotion to duty in leading stretcher bearers under fire.

No. 17907 Private J. E. Hobson.

For gallant conduct in the performance of his duties, collecting the wounded whilst under fire.

No. 17711 Corporal D. C. Holland.

For gallant conduct and good work near Troyon on September 20 and 21, 1914, in attending on the wounded under fire.

No. 5557 Private R. J. Hopkins.

For conspicuous gallantry and devotion to duty during the campaign from August to November, especially on September 16, and at Soupir Ridge on October 14, 1914, in gallantly attending to the wounded in the fire trenches. Again, at Langemarck, on October 21, and throughout the operations around Ypres, he attended on the wounded under heavy rifle and shell fire.

No. 9190 Private W. W. Kirk.

For gallant conduct on several occasions in bringing in the wounded under heavy fire.

No. 4097 Private W. Mosdell.

For gallant conduct and good work performed on many occasions under fire, in finding the wounded and bringing assistance to them, especially at Neuve Chapelle.

No. 8575 Private C. A. Olds.

For gallant conduct in the performance of his duties whilst exposed to heavy shell fire.

No. 19306 Private C. Speller.

For gallant conduct on several occasions in bringing in the wounded under heavy fire.

No. 8335 Private A. Spencer.

For gallant conduct on several occasions in bringing in the wounded under heavy fire.

No. 11029 Quartermaster Serjeant A. Spewage.

For gallant conduct and good work throughout the campaign, especially at Jary, from September 13 to 30, 1914, when he displayed great zeal and devotion to duty in attendance on the wounded.

No. 7906 Private M. Sullivan.

For gallant conduct in the performance of his duties whilst exposed to heavy shell fire.

No. 8310 Private J. Webster.

For gallant conduct in the performance of his duties, collecting the wounded whilst under fire.

PROMOTIONS.

The following promotions to complete War Establishment will take effect from the dates specified:—

To be Serjeant-Majors.

No.	Rank and Name	Date	Remarks
12056	Qmr.-Serjt. Winton, E.	15.3.15	
11946	" Gosling, E. J.	"	
15096	" Pugh, J. E.	"	
14647	" Court, F. G.	"	
18439	" Leach, W. T... ..	13.4.15	
12285	" Burton, C. A... ..	"	
12623	" Rolfe, H. S.	"	
11565	" Jones, J. H.	"	
16216	" Robinson, J. W.	"	
16265	" Simes, P. T.	"	
12155	" McKay, A.	"	
17849	" Blanks, C. C.	"	
11816	" Shepherd, L. A.	"	
18912	" Dawson, H.	"	

To be Quartermaster-Serjeants.

12504	Staff-Serjt. Shepherd, E.	15.3.15	
11807	" Levey, I.	"	
11896	" Spackman, A. P.	"	
14770	" Buckner, A.	"	
15544	" Barnes, E. J.	"	
17633	" Sproule, R.	"	
15843	" Stokes, W.	13.4.15	
16205	" Gregson, T.	"	
16569	" Attfield, E.	"	
14326	" Morman, W. P. S.	"	
18453	" Philbrook, F. A.	"	
17748	" Dissent, C. H.	"	
13661	" Le Page, P. J.	"	
18216	" Leggett, R. G.	"	
18976	" Robinson, E. G.	"	
18337	" Leaker, C.	"	

To be Staff-Serjeants.

17513	Serjeant Gallivan, J.	1.3.15	With seniority next below No. 17390 Staff-Serjeant R. Cowx.
16323	" McKenna, W.	15.3.15	
11566	" Brown, M. T... ..	"	
15196	" Pepper, C. T.	"	
12775	" Pretti, H. C.	"	
17870	" Cragg, E.	"	
17964	" Bowler, W.	"	
17834	" Harman, F.	"	
17825	" Moore, N.	"	
17977	" Davis D.	"	
18657	" Tripp, V.	20.3.15	
12376	" Walsh, J. B.	13.4.15	
19192	" Poole, F.	"	
19595	" Bull, C. E.	"	
17714	" Robinson, A. R.	"	
19933	" Savegar, W. C.	"	
16949	" Ireland, G.	"	
17001	" Blair, D.	"	
19966	" Chatten, G. V.	"	
18185	" Mayo, W. C. H.	"	
18988	" Haigh, R. H. T.	"	

To be Serjeants.

No.	Rank and Name		Date	Remarks
19432	Corporal	Parker, W. T... ..	20.1.15	As being in possession of A.F.C. 344. With seniority next below No. 19497 Serjeant J. A. Jackson.
7612	Corporal	Lauraine, G.	20.1.15	As Dispenser. With seniority next below No. 19065 Serjeant C. J. Vinton.
18864	Corporal	Thorburn, J.	20.1.15	As being in possession of A.F.C. 344. With seniority next below No. 1247 Serjeant F. E. Buckland.
5110	Corporal	Samme, J. E... ..	1.3.15	As being in possession of A.F.C. 344.
5868	"	Bowden, R. J.	"	As being in possession of A.F.C. 344. With seniority next below No. 17598 Serjeant W. Sparks.
19776	Corporal	Swan, G.	14.3.15	As being in possession of A.F.C. 344.
18587	"	Leeming, C.	"	As being in possession of 1st Class Cert.
4836	"	Douglas G.	"	As being in possession of A.F.C. 344.
11732	Lance-Serjt.	Hattam, H. S.	15.3.15	
14662	"	Taylor, C. E.	"	
18128	"	Marr, J. T.	"	
18805	"	Charlton, W.	"	
19234	"	Thurgar, E.	"	
12278	"	Male, G. H.	"	
6714	"	Barnard, D.	"	
11698	"	Twomey, J.	"	
2031	"	Huppler, N.	"	
18833	"	Crook, R.	"	
5562	"	Caseley, A. C. J.	"	
11424	Corporal	Weavis, E.	"	
10541	"	Chambers, T... ..	"	
10651	"	Gresham, H.	"	
12100	"	Beams, A. E... ..	"	
10312	"	Collins, W.	"	
12913	"	Plant, J.	"	
18131	"	Greenhalgh, W.	20.3.15	
19864	"	Pitt, T. R.	6.4.15	As being in possession of A.F.C. 344.
15765	"	Spalding, A.	13.4.15	
15007	"	Collbran, T. C.	"	
12267	"	Connolley, J.	"	
9718	"	Abbott, W.	"	
11594	"	Ryan, C.	"	
11600	"	Prebble, E. A.	"	
12954	"	Whitley, J.	"	
12154	"	Powell, L. A.	"	
17316	"	Batterham, E. J.	"	
18926	"	Worrad, W.	"	
11691	"	Hayter, J.	"	
12650	"	Wyke, E.	"	

To be Corporals.

No.	Rank and Name		Date	Remarks
9296	Private	Buck, F.	14.3.15	} Having been awarded Distinguished Con- duct Medals.
11553	"	Leach, G. W.	"	
11860	"	Vowles, W. G.	"	
12781	"	Walton, W.	15.3.15	
13045	"	Turner, G. F.	"	
14635	"	Cook, C. W.	"	
14768	"	Peavey, A.	"	
14855	"	Mann, R. H.	"	
16092	"	Crowe, G.	"	
17580	"	Walsh, M.	"	
17594	"	McCristall, E.	"	
17831	"	Edwards, J. P.	"	
18189	"	Wass, A.	"	
18326	"	Harris, R. E. S.	"	
18585	"	Mills, F.	"	
19598	"	Dawes, P.	"	
238	"	Sheehan, J. D.	"	
364	"	Morrall, A.	"	
812	"	Dick, J.	"	
964	"	Richardson, A. A.	"	
19484	"	Posner, W. T.	20.3.15	
1102	"	Hake, J. G.	21.3.15	
1424	"	Ryan, J.	"	
1492	"	Jacobs, A.	24.3.15	
17907	"	Hobson, J. E.	13.4.15	
19306	"	Speller, C.	"	
5557	"	Hopkins, R. J.	"	
7906	"	Sullivan, M.	"	
4097	"	Mosdell, W.	"	
641	"	Hill, G.*	"	
8313	"	Foulkes, J. W.	"	
8335	"	Spencer, A.	"	
8310	"	Webster, J.	"	
1553	"	Garvey, J.	"	
1616	"	Yates, H. C.	"	
1865	"	Johnstone, R.	"	
1926	"	Clements, R.	"	

* Special Reserve.

These promotions are subject to the conditions laid down in paragraph 35 Standing Orders, Royal Army Medical Corps, 1914.

AWARD OF ARMY FORM "C. 344."

The undermentioned have been awarded Army Form C. 344 on completion of three years' training in accordance with Paragraph 330 Standing Orders on the dates specified :—

No.	Rank and Name		Date	No.	Rank and Name		Date
17730	S.-Sjt.	Wills, P.	30.9.14	5128	Corpl.	Dean, P.	24.2.15
5110	Corpl.	Samme, J. E.	24.2.15	5463	Pte.	Taylor, H. E.	"
5368	"	Bowden, R. J.	"	4836	Corpl.	Douglas, G.	3.3.15
2242	"	Thomson, J... ..	"				

NURSING SECTION.

The following appointments to the Nursing Section of the Corps will take effect from the dates specified:—

No.	Rank and Name		Date	Remarks
17797	Private	Scott, H. F.	6.2.15	Re-appointed.
18006	"	Wenford, G.	20.2.15	
19281	"	Northcote, F. T.	"	
1966	"	Jones, J. P.	"	
2578	"	Towers, G. W.	"	
2690	"	Hamer, W. H.	"	
2747	"	Lolley, W.	"	
2754	"	Lindsay, E.	"	
2960	"	Titley, F.	"	
2978	"	Williams, A. E.	"	
3002	"	Faram, J.	"	
7971	"	Westgarth, S.	"	
1108	"	Provan, W.	28.2.15	
1994	"	Brand, H. G.	"	
1579	"	Bray, C.	"	
5245	"	Betts, W.	"	
5701	"	Bush, F. G.	"	
5877	"	Dodge, W. F... ..	"	
20617	"	Carpenter, F. W.	"	
20401	"	Nash, C. A.	"	
20018	"	Rodgers, O. J.	"	Re-appointed.
399	"	Boyles, F. J.	6.3.15	
5540	"	Hillman, W.	"	
5474	"	Sullivan, J. M.	"	
4875	"	Stainton, W. R.	9.3.15	
8920	"	Goodman, A. J.	"	
5898	"	Stone, C. E.	10.3.15	
4410	"	Anderson, G.	"	
2677	"	Sharp, A.	"	
6992	"	Hancock, G. V.	"	
2741	"	Haynes, J. H.	"	
6778	"	Hassell, W.	"	
19214	"	Parker, S. J.	"	
4375	"	Tice, R.	"	
2104	"	Smith, F. P.	"	
4375	"	Eate, E. J.	"	
7225	"	Monk, H. T.	"	
787	"	Clement, C.	"	
7390	"	Orme, C.	11.3.15	
2585	"	McDonald, C... ..	16.3.15	
6419	"	Parish, J. H.	18.3.15	
19203	"	Ford, J.	20.3.15	
2015	"	Hayward, S. E.	"	Re-appointed.
5215	"	Herbert, W. A.	"	
6066	"	Mayhew, F.	"	Supernumerary.
5479	"	Weyman, A. J.	"	
4753	"	Howell, R. H.	26.3.15	
5641	"	Brown, T.	30.3.15	
5052	Serjeant	Jepp, J. W.	1.4.15	
5571	Private	Taylor, J. A.	5.4.15	
7353	"	Harris, C. A. G.	"	
20585	"	Thomas, L. A.	"	

SANITARY ORDERLIES.

The following Privates are advanced to the fourth rate of Corps Pay at 6d. as Sanitary Orderlies from the dates specified :—

No.	Rank and Name	Date	No.	Rank and Name	Date
5279	Pte. Millgate, E. F.	6.11.14	6014	Pte. Clark, W. ..	6.11.14

BUGLERS.

The undermentioned Boys are appointed Buglers, from April 15, 1915, inclusive :—

9477 Ward, E. L. | 9925 Brunsden, H. R.

RE-POSTING TO CORPS.

The undermentioned N.C.O.'s rejoined the Corps on the dates specified :—

No.	Rank and Name	Date	Remarks
16301	Staff-Serjt. Lane, A. E.	28.2.15	From Colonial Govt.
15848	„ Garbett-Burbridge ..	12.3.15	From Territorial Force.

AMENDMENT—CORPS ORDERS.

(a) In Corps Order dated December 12, 1914, the name of No. 309 Private A. J. Turner should be added to the list of Warrant Officers, Non-commissioned Officers and men mentioned in the despatch from the Field-Marshal Commanding the Expeditionary Force published in the *London Gazette*, No. 28943, of October 19, 1914.

(b) In Corps Order dated March 6, 1915, under the heading "To be Corporals," for "12081 H. Gunter," read "12081 H. Gunton."

PROMOTION CANCELLED.

The promotion of No. 12706 Private A. J. Jeffrey to the rank of Corporal, published in Corps Order dated March 6, 1915, is hereby cancelled.

HOME HOSPITALS RESERVE.

PROMOTION.

The following promotion will take effect from the date specified :—

To be Corporal.

No. 28845 Private W. Watt, April 1, 1915.

Advancement of Orderlies (Corps Pay).

The following advancement in rate of Corps Pay will take effect from February 6, 1915 :—

To be advanced to the fourth rate at 6d.

As Orderly.

No. 27813 Private A. Osmon.

AMENDMENT—CORPS ORDERS.

(a) In Corps Order dated February 24, 1915, for "28234 H. Jones" read "28492 H. Jones."

(b) In Corps Order dated April 1, 1915, under the heading "To be Corporals," for "25581 J. Parkes" read "25581 J. Parker."

PROMOTIONS CANCELLED.

The promotions of No. 27546 Private S. Stopford and No. 26943 Private P. O'Crawley to the rank of Corporal, notified in Corps Order dated April 1, 1915, are hereby cancelled.

NOTICE.

It is notified for general information that approval has been given for the relaxation of paragraph 82, Standing Orders Royal Army Medical Corps, 1914, for the present on the following conditions:—

3rd Class Orderlies will be eligible for advancement to 2nd Class after completing six months' service.

2nd Class Orderlies will be eligible for advancement to 1st Class after completing one year's service, and not less than six months as 2nd Class.

In all cases the men must be recommended by the Officer under whom they are serving and the Matron (when one is doing duty).

The same procedure may be adopted for members of the Nursing Section of the Home Hospitals Reserves.

LONDON GAZETTE.

The following notification appeared in the *London Gazette* of May 8, 1915:—

ROYAL ARMY MEDICAL CORPS.

The undermentioned Serjeant-Majors to be Quartermasters, with the honorary rank of Lieutenant:—

Dated May 9, 1915.—Walter Ernest Squire, David Charles Baxter, Ernest Janes, James Maurice Maxwell, Henry Sprinks, Walter Clegg, Charles Joseph Hazell, Harry John Reeve, Joseph James Earp, Henry John Anderson.

PROMOTIONS.

The following promotions, to complete War Establishment, will take effect from the dates specified:—

To be Serjeant-Majors.

No.	Rank and Name		Date	Remarks
12352	Qmr.-Serjt.	Curtis, J. H.	9.5.15	
16264	"	Harper, W.	"	
6966	"	Cotter, J.	"	
9682	"	Baxter, J.	"	
10290	"	Thomas, J. H.	"	
10142	"	Cardwell, T. W.	"	
9375	"	Allford, W.	"	
9088	"	Medwell, A.	"	
8587	"	Connell, J.	"	
10690	"	Le Poidevin, P.	"	
8287	"	Maitland, W. E.	13.5.15	

To be Quartermaster-Serjeants.

10675	Staff-Serjt.	Richardson, W.	20.1.15	} With seniority next below No 121 Qmr.-Serjt. J. E. Newton
12391	"	Ogden, H.	"	
18149	"	Godfrey, A. H.	"	
16165	"	Bullough, P.	"	} With seniority next below No. 10458 Qmr.-Serjt. W. Langston.
17973	"	Knott, F.	6.2.15	
				} With seniority next below No. 15983 Qmr.-Serjt. C. E. Lister.
10890	"	Davidson, A.	9.5.15	
18432	"	Pearce, G. F.	"	
18445	"	Crawley, J. E.	"	
17500	"	White, R. R.	"	

To be Quartermaster-Serjeants—Continued.

No.	Rank and Name		Date	Remarks
18239	Staff-Serjt.	Roland, R. F. ..	9.5.15	
17928	"	Toye, W. S. ..	"	
18385	"	Coupland, F. W. ..	"	
18645	"	Rouse, C. E. ..	"	
12461	"	Cook, P. F. ..	"	
19253	"	Wilson, C. ..	"	
18158	"	Pursey, G. P. ..	"	
15288	"	Prince, W. C. ..	"	
15591	"	Harris, J. ..	"	
15813	"	Hoggie, A. V. ..	"	
18110	"	Gibson, R. W. ..	"	
18948	"	Moore, E. ..	13.5.15	
18391	"	Turner, E. C. ..	15.5.15	
15671	"	Cole, R. W. ..	18.5.15	
15483	"	Sharp, E. ..	"	

To be Staff-Serjeants.

19732	Serjeant	Mayes, H. ..	9.5.15	
19618	"	Bettinson, P. ..	"	
11015	"	Phillips, W. E. ..	"	
45	"	Moffatt, T. J. ..	"	
19070	"	Siddall, H. ..	"	
15183	"	Dewhurst, C. ..	"	
14850	"	Mayman, T. G. ..	"	
17501	"	Christie, J. ..	"	
17506	"	Blong, P. ..	"	
18199	"	Staff, A. H. ..	"	
18215	"	Dewey, W. W. ..	"	
18226	"	Bilbee, L. V. ..	"	
19223	"	Stafford, J. H. ..	"	
874	"	Johnson, F. A. ..	"	
19558	"	Lythgoe, T. ..	"	
11437	"	Deasley, J. W. ..	"	
18040	"	Tootill, W. ..	"	
18262	"	Clear, E. W. ..	"	
18259	"	Roden, W. T. ..	"	
18335	"	Woolway, W. J. ..	"	
18330	"	Mercer, J. N. ..	"	
18340	"	Rouse, J. ..	"	
12402	"	Rondel, T. E. ..	"	
12618	"	Mayman, W. A. ..	"	
12474	"	Soper, W. ..	"	
17162	"	Rogers, T. ..	"	
18043	"	Eagar, R. ..	"	
18383	"	Hutchings, W. ..	13.5.15	
18418	"	Smith, G. ..	15.5.15	
18443	"	Harris, G. ..	"	
18447	"	Fakes, J. E. ..	"	
18490	"	Cooper, H. ..	"	
19652	"	Jefford, C. V. ..	"	
764	"	Boddy, R. ..	18.5.15	
391	"	Scorey, W. J. ..	"	
2046	"	Hammond, S. J. ..	"	
1847	"	Ogg, R. W. ..	"	

To be Serjeants.

No.	Rank and Name	Date	Remarks
10759	Corporal Simmons, J. I. ..	15.3.15 ⁷	With seniority next below No. 5562 Serjt. A. C. J. Caseley.
11823	„ Fryer, J.	„	With seniority next below No. 10651 Serjt. H. Gresham.
12492	„ Kinsella, W.	„	With seniority next below No. 10312 Serjt. W. Collins.
12423	„ Sharpe, W.	13.4.15	With seniority next below No. 12267 Serjt. H. Connelley.
10915	„ Corney, T.	9.5.15	
11455	„ Magee, W. H.	„	
8921	„ Critchley, J.	„	
10105	„ Clement, J. H.	„	
19211	„ Clement, W. G.	„	
11632	„ Bird, J.	„	
11631	„ Chipchase, H.	„	
12238	„ Howes, E.	„	
12520	„ Symmonds, W. J.	„	
18987	„ Tanner, G. J.	„	
12948	„ Neale, F. A.	„	
14623	„ Davidson, S. F. D.	„	
11763	„ Green, J. T. G. W.	„	
15430	„ Pollock, J.	„	
15859	„ Arnold, P.	„	
9993	„ Weatherhill, R. G.	„	
11258	„ Leggatt, G.	„	
11560	„ Clark, J.	„	
13058	„ Heggie, F. G.	„	
16167	„ Greenham, W. E.	„	
18566	„ Butler, H.	„	
16448	„ Buchan, A.	„	
10865	„ Cornwell, J.	„	
11313	„ Bateman, A.	„	
12686	„ Chatfield, W. H.	„	
15981	„ Hayes, R.	„	
15289	„ Rodman, H. R. M.	„	
17165	„ Holloway, F. T.	13.5.15	
18530	Lcs.-Serjt. Murphy, A.	15.5.15	
12071	Corporal Everett, C.	„	
12384	„ Burnhill, T. W.	„	
13018	„ Turner, G.	„	
16882	„ Short, G. J.	„	
17303	„ Auchterlonie, A.	18.5.15	
17497	„ Genge, F.	„	
19661	„ Tempest, S. H.	„	
12344	„ Lucas, F. H.	„	

To be Corporals.

11355	Private Jackson, G. F. ..	9.5.15
11489	„ Mulhern, J.	„
11869	„ Maxted, G. R.	„
12263	„ Morris, W.	„
12359	„ Lalor, G.	„
12538	„ Murray, A.	„
12694	„ McCaffery, F.	„

To be Corporals—Continued.

No.	Rank and Name		Date	Remarks
12854	Private	Lambert, G. S. ..	9.5.15	
13031	"	Cheney, H. J. ..	"	
15774	"	McDonald, J. ..	"	
16766	"	Hay, W. ..	"	
18327	"	Beattie, G. ..	"	
18892	"	Hayes, G. ..	"	
1985	"	Brown, R. H. ..	"	
2126	"	Hardy, R. H. ..	"	
2125	"	Kellow, W. ..	"	
2255	"	Pool, L. F. ..	"	
2258	"	Edmonds, W. ..	"	
3950	"	Nice, W. J. ..	"	
3987	"	Hill, R. ..	"	
4351	"	Gibson, H. W. ..	"	
4584	"	Walsh, J. W. ..	"	
4692	"	Dale, J. E. ..	"	
4826	"	Wheeler, W. H. ..	"	
5037	"	Sykes, W. J. ..	"	
6954	"	Fallaize, W. E. ..	"	
5190	"	Clark, A. ..	"	
5214	"	Stanford, E. R. ..	"	
5454	"	Hill, T. G. ..	13.5.15	
5457	"	McGrath, W. ..	15.5.15	
6269	"	Dixon, A. H. ..	"	
6309	"	Keen, C. F. ..	"	
6582	"	Warnoch, T. ..	"	
6608	"	Wilce, S. G. ..	"	
7194	"	Eccleshall, S. ..	"	
7266	"	McNeill, J. E. ..	18.5.15	
20207	"	Self, E. J. ..	"	Special Res. Cat. "B."
20818	"	Downing, A. ..	"	" " "
20165	"	Brownlee, H. ..	"	" " "

These promotions are subject to the conditions laid down in paragraph 35, Standing Orders, Royal Army Medical Corps, 1914.

AWARD OF ARMY FORM C. 344.

The undermentioned have been awarded Army Form C. 344, on completion of three years' training in accordance with paragraph 330, Standing Orders, on the dates specified :—

No.	Rank and Name		Date	No.	Rank and Name		Date
17699	Serjt.	Morrall, C. ..	31.12.12	4842	Private	Ricks, A. C. ..	15.3.15
29	"	Hart, J. ..	12.1.15	2060	"	Hoult, E. ..	24.4.15
5232	Corpl.	Drury, S. T.	9.3.15				

NURSING SECTION.

The following appointments to the Nursing Section of the Corps will take effect from the dates specified :—

No.	Rank and Name		Date	Remarks
1933	Private	Radford, F. C. ..	10.11.14	Special Res. Cat. "B."
2586	"	McEllhatton, J. ..	"	
6141	"	Compton, J. H. ..	11.4.15	
20440	"	Mallett, W. A. ..	16.4.15	
3447	"	Skelsey, J. ..	17.4.15	
4773	"	Younger, C. F. ..	18.4.15	
18590	"	Clark, W. H. ..	"	
19889	"	Kirk, A. ..	"	
17312	"	Litchfield, C. ..	"	
5776	"	Lewis, R. C. ..	20.4.15	
8916	"	Archer, C. W. ..	29.4.15	
2088	"	Clarke, J. ..	2.5.15	
5405	"	Meginis, P. ..	"	
5487	"	Morris, C. O. ..	"	
9903	"	Newman, T. G. A. ..	"	
1547	"	Robinson, F. W. ..	"	
19043	"	Speers, W. ..	"	
7745	"	Songhurst, L. F. ..	"	
7595	"	Salter, S. ..	"	
19229	"	Sullivan, J. ..	"	
18168	"	Wood, A. ..	"	
5236	"	Welch, D. ..	"	
5755	"	Wilkins, C. F. ..	"	
6102	"	Hawkins, C. ..	16.5.15	
18531	"	Tracey, E. ..	"	
10043	"	Loxley, E. A. ..	"	
4538	"	West, J. B. T. ..	"	
4492	"	Edgar, R. ..	"	
4417	"	Barrett, J. A. ..	10.5.15	Re-appointed.
2298	"	Greene, J. ..	"	
1980	"	Jacobs, G. E. ..	"	
5323	"	Bailey, R. ..	"	
4449	"	Coulter, J. ..	"	
5039	"	Edwards, A. E. ..	"	
6372	"	Jordan, T. ..	"	
6389	"	Lyons, B. ..	"	
6618	"	Lowes, W. H. ..	"	
1351	"	Rannow, E. G. V. ..	"	
7324	"	Strickland, J. ..	"	
4457	"	Sellers, W. A. ..	"	
4450	"	Sewell, S. T. ..	"	
2293	"	Stowe, O. H. ..	"	
7903	"	Bates, G. ..	14.5.15	
1895	"	Bullied, S. ..	"	
1210	"	Watford, S. ..	"	
2241	"	Windle, G. H. ..	"	
5953	"	Tait, R. F. ..	"	
6607	"	Jacobs, E. ..	16.5.15	

ADVANCEMENT OF ORDERLIES (CORPS PAY).

The following advancements in rate of Corps Pay will take effect from May 15, 1915:—

TO BE ADVANCED TO THE THIRD RATE (AT 8D.).

As Orderlies.

No.	Name	No.	Name	No.	Name
1580	Gray, A.	6233	Cox, T.	4428	Barker, K.
1879	Harris, G.	1667	Turner, C. W.	6694	Cheney, T. J. S.
6936	Jordan, H. W.	18086	Fry, G.	4709	Crosland, R. J.
17574	Collins, T.	4435	Hunter, J. G.	2028	Howard, J.
6093	Pennington, A. T.	5021	Johns, A. F.	4719	McGibbon, J.
2060	Hoult, E.	14616	Jones, A. H.	6720	Preston, E. T. G.
5869	Carew, P.	18292	Wicks, C. W.	6706	Sims, G. J.
18824	Barrett, G.	1987	Herbert, J. C.	2141	Gray, C.
12291	Sadler, J. C.	11044	Best, F.	2206	Ede, L. C.
4911	Washbrook, H.	14068	Beck, R.	17817	Huggett, J. G.
19358	Calvert, F.	5570	Dobson, F. E. J.	18891	Rainger, C.
6257	Wadham, C. T. H.	1789	Postons, F. A.	6256	Donovan, J.
19052	Grey, S. E.	6704	Cooper, F.	16475	Jeffrey, J.
56	Quinn, C.				

As Clerks.

4924	Kelly, A. B.	6742	Crane, A. H.	5285	Bellingham, C. H.
18596	McKeevor, E. O.	5333	Farley, W. H.		

As Superintending Cook.

5602 | O'Brien, J.

TO BE ADVANCED TO THE FOURTH RATE (AT 6D.).

As Orderlies.

No.	Name	Remarks	No.	Name	Remarks
6376	Norman, W. F.		5440	Price, J. R.	
1631	Steadman, F. G.		2585	McDonald, C.	
1333	Hill, W. E.		1994	Brand, H. G.	
1933	Radford, F. C.		5701	Bush, F. G.	
3774	Badcock, E.		5977	Dodge, W. F.	
3789	Balcham, C.		20018	Rodgers, O. J.	Special Res. Cat. "B."
1179	Collard, F. H.				
3789	Godley, F.		1579	Bray, C.	
1313	Wigley, J.		20617	Carpenter, F. W.	Special Res. Cat. "B."
965	Tear, E. S.		20401	Nash, C. A.	
17797	Scott, H. F.		4430	Adderly, J.	
7386	Dunn, W.		4429	Beck, R.	
2	Southwell, W. H.		6224	Banks, G.	
19083	Austin, S. C.		3002	Faram, J.	
19101	Flaxman, W. A.		4884	Higgins, G.	
1103	Proven, W.		2690	Hamer, W. H.	
399	Boyles, F. J.		2747	Lolley, W.	
5540	Hillman, W.		2578	Towers, G.	
4514	Tocock, J. H.		18006	Wenford, G.	
4875	Stainton, W. R.		2973	Williams, A. E.	
8920	Goodman, A. J.		5118	O'Donohoo, W. C.	
6419	Parish, J. H.		14980	Bowden, A.	
19203	Ford, J.		884	Crutch, J.	
2015	Hayward, S. E.		505	Morris, E. P.	
5215	Herbert, W. A.		7408	Whitney, H.	
6066	Mayhew, F. F. T.		5147	Mullen, J.	
5479	Weyman, A. J. McK.		5253	Kelsey, J. A.	
4638	Rochrig, R. F.		5610	Palmer, E. L.	

As Clerks.

No.	Name	No.	Name	No.	Name
5676	Jacobs, A.	7163	Sharrock, J.	5471	Thompson, F.
931	Haines, J.	4438	Smith, S.	2894	Paterson, G.
19447	Beckley, H. E.	18522	Fielder, E. E.	7746	Richfield, E. T.
7662	Mallot, F. P.	4411	Harold, S. F.	4661	Smith, T.
4834	Keating, R. L.				

As Cooks.

7374	Brownridge, C.	6300	Arthur, A.	18711	Ball, W.
6924	Hewer, C.				

These advancements are subject to the conditions laid down in paragraph 35, Standing Orders for the Royal Army Medical Corps.

BUGLERS.

The undermentioned Boys are appointed Buglers from May 5, 1915, inclusive :—

No.	Name	No.	Name	No.	Name
10079	Bird, J.	10083	Cooper, F.	11416	Andrews, M. J.

"LONDON GAZETTE."

The following notification appeared in the *London Gazette* of June 4, 1915 :—

"ROYAL ARMY MEDICAL CORPS.

"The undermentioned Serjeant-Majors to be Quartermasters, with the Honorary rank of Lieutenant.

"Dated June 5, 1915.—Charles Frederick Houston, Arthur McCreeth, John Henry McClelland, Henry Robinson, Robert Ashton, Harry Steele, David Watt."

DISTINGUISHED CONDUCT MEDALS.

His Majesty the King has been graciously pleased to approve of the award of the Distinguished Conduct Medal to the undermentioned Non-commissioned Officers and men for acts of gallantry and devotion to duty. (*Supplement to the "London Gazette,"* No. 29180, dated June 3, 1915.)

No. 6630 Private T. Bennet.

For conspicuous gallantry and devotion to duty on October 19, 20, and 31, 1914, in collecting and attending on the wounded whilst under fire.

No. 19032 Serjeant J. Cooke.

For conspicuous gallantry, resource, and marked initiative on August 26, 1914, when he forcibly took possession of and removed a complete supply train from Boue to Etreux. The driver escaped with his engine at the latter place, and Serjeant Cooke at once commandeered another engine and driver, and having placed all the wounded in the train took it safely into Havre on August 29. During the journey the enemy directed a heavy fire on the train, but did little damage.

No. 18570 Corporal J. Hart.

For gallant conduct, ability, and devotion to duty on November 4 and 5, 1914, when he established and maintained a field dressing station, under a very heavy fire at Walverghem. Corporal Hart, in addition to looking after our own wounded, treated a large number of the wounded French soldiers with great skill.

No. 19026 Private J. Hughes.

For gallantry at Messines on October 31, 1914, when he went into the trenches under heavy fire and assisted in carrying away the wounded.

No. 6309 Private C. F. Keen (now Corporal).

For gallantry in carrying messages under heavy fire on October 31, 1914, and also for gallant conduct in attending on the wounded under fire.

The Director-General, in recognition of the credit which these gallant actions reflect on the individuals concerned and on the Corps, has directed that the Privates shall be promoted to the rank of Corporal as vacancies occur.

PROMOTIONS.

The following promotions to complete War Establishment, will take effect from the dates specified:—

To be Serjeant-Majors.

No.	Rank and Name	Date	Remarks
10895	Qmr.-Serjt. Perritt, W. E. ..	5.6.15	
11843	" Baxendale, J. ..	"	
10849	" Richmond, C. E. T. ..	"	
11626	" Easey, H. J. ..	"	
11224	" Rayer, A. T. ..	"	
11029	" Spowage, A. ..	"	
11403	" Wagstaffe, P. E. ..	"	

To be Quartermaster-Serjeants.

10710	Staff-Serjeant	Moore, J. ..	20.1.15	With seniority next below No. 12104 Qmr.-Serjt. J. E. Newton.
16231	"	Mason, H. B. ..	15.3.15	With seniority next below No. 14770 Qmr.-Serjt. A. Buckner.
18577	"	Read, F. L. ..	9.5.15	With seniority next below No. 15813 Qmr.-Serjt. A. V. Heggie.
17057	"	Ward, M. ..	1.6.15	
18192	"	Harlen, M. ..	"	
18969	"	Gray, E. ..	"	
13032	"	Kerr, T. ..	"	
17987	"	Betts, A. ..	5.6.15	
12989	"	Barnes, E. G. W. ..	"	
16678	"	March, J. E. ..	"	
12779	"	Stubbs, G. ..	"	
11614	"	Howard, W. H. ..	"	
18222	"	Dady, A. ..	"	
14761	"	Robertson, W. ..	15.6.15	
17555	"	Kinder, M. ..	"	

To be Staff-Serjeants.

19543	Serjeant	Audus, F. E. H. ..	1.6.15	
18507	"	Gerrie, W. A. ..	"	
18509	"	McFarland, J. ..	"	
18571	"	Pepper, F. T. ..	"	
18559	"	Rodgers, G. F. ..	"	
18621	"	Walton, A. J. ..	"	
14337	"	Sadler, G. ..	"	
17699	"	Morrall, C. ..	"	
18427	"	Barber, P. ..	"	
18893	"	Hazell, J. ..	"	
18627	"	Cockburn, B. ..	"	
18656	"	Maywood, H. G. ..	"	
18739	"	Bradford, R. C. ..	"	

To be Staff-Serjeants—Continued.

No.	Rank and Name		Date	Remarks
18737	Serjeant	Stovold, W. T. ..	1.6.15	
18763		Smith, F. J. ..	5.6.15	
18821	"	Weston, G. ..	"	
105	"	Newman, F. ..	"	
1856	"	Leaney, A. F. ..	"	
19007	"	Dare, J. R. ..	"	
19093	"	Lane, A. ..	"	
266	"	George, W. E. ..	15.6.15	
18409	"	Horsfield, F. M. ..	"	
19102	"	Hughes, H. C. ..	"	
18832	"	Heard, G. ..	"	
18855	"	Ellison, J. ..	"	
18854	"	Forge, C. D. ..	"	
18903	"	Male, A. ..	"	
17319	"	Hort, A. T. ..	"	
19980	"	Loder, H. J. ..	"	
18929	"	Taylor, J. W. ..	"	

To be Serjeants.

19370	Corporal	Potter, T. H. ..	20.1.15	With seniority next below No. 18984 Serjeant B. Breeze.
18950	"	Fielder, A. J. ..	"	With seniority next below No. 18864 Serjeant J. Thorburn.
13927	"	Wallace, T. C. ..	1.6.15	
12440	"	Smith, R. ..	"	
16677	"	McDonald, C. ..	"	
17721	"	Fetherston, R. ..	"	
17379	"	Hardy, E. ..	"	
17787	"	Whyatt, A. H. ..	"	
17836	"	Pratt, T. S. ..	"	
17845	"	Worsfold, A. ..	"	
17848	"	Reilly, T. ..	"	
18816	"	Bond, G. W. ..	"	
17875	"	Walton, R. ..	"	
10754	"	Cooper, A. T. ..	"	
17974	"	Moon, F. V. ..	"	
18029	"	Burr, A. L. ..	"	
18019	"	Julyan, J. G. ..	5.6.15	
15655	"	Caborn, G. J. ..	"	
168	"	Watkins, T. J. ..	"	
18200	"	Collings, W. G. ..	"	
15803	"	Stuart, H. B. ..	"	
17711	"	Holland, D. C. ..	"	
14452	"	Godfrey, F. ..	15.6.15	
18257	"	Percy, J. ..	"	
18258	"	Tempo, H. ..	"	
18318	"	Thomas, E. G. ..	"	
19256	"	King, W. ..	"	
11951	"	Hoodless, T. J. ..	"	
13036	"	Flood, S. ..	"	
16299	"	Plunkett, E. P. ..	"	
10555	"	Holden, W. C. ..	"	
11532	"	Callander, A. ..	"	

To be Corporals.

No.	Rank and Name		Date	Remarks
10981	Private	Marsh, W.	1.6.15	{ In accordance with Corps Order No. 50 of this date.
15517	"	Gilchrist, A.	"	
18118	"	Hall, S. H.	"	
18782	"	Merrick, W. J.	"	
19094	"	Stanton, G. R.	"	
19242	"	Steele, G.	"	
19302	"	Barnshaw, F. W.	"	
19336	"	Barnes, A.	"	
19480	"	Hughes, W. R.	"	
19482	"	Dean, F.	"	
19748	"	Parr, C. H.	"	
19951	"	Alberts, G.	"	
11	"	Andre, J.	"	
39	"	Webb, C. E.	"	
157	"	Holloway, T. G. R.	"	
221	"	Long, G. J.	"	
1033	"	O'Shea, W.	"	
346	"	Middleton, J.	"	
397	"	Young, L. R.	"	
19026	"	Hughes, J.	3.6.15	
6630	"	Bennet, T.	"	
19326	Loc.-Corporal	Hewitt, H. W.	5.6.15	
918	Private	Simpson, T. E.	"	
928	"	Morris, W.	"	
1080	"	Humphreys, J. H.	"	
1383	"	Rouse, J.	"	
1404	"	Bawden, C. B.	"	
50	Loc.-Corporal	Wilson, H.	15.6.15	
1580	Private	Gray, A.	"	
1630	"	Riley, E.	"	
1862	"	Doyle, G. A.	"	
2139	"	Slade, C. F.	"	
4396	"	Way, A. J.	"	
4697	"	Tucker, J. H.	"	
4867	"	Eckersley, A. V.	"	
7156	"	McFadyen, G.	"	
20447	"	McNeill, D.	"	

These promotions are subject to the conditions laid down in paragraph 35, Standing Orders, R.A.M.C., 1914.

AWARD OF ARMY FORM C. 344.

The undermentioned have been awarded Army Form C. 344 on completion of three years' training in accordance with paragraph 330, Standing Orders, on the dates specified :—

No.	Rank and Name		Date	Remarks
4368	Corporal	Hardy, C.	10.5.15	
14538	Staff-Serjt.	Wells, H.	1.6.15	
19536	Serjeant	Reece, W. E.	"	

NURSING SECTION.

The following appointments to the Nursing Section of the Corps will take effect from the dates specified :—

No.	Rank and Name	Date	Remarks
6803	Private Lee, W.	23.4.15	
17707	" Taylor, P.	"	Reappointed 16.5.15.
7021	" Tilley, R. W.	16.5.15	
445	" Goff, J... ..	"	
19841	" Theobald, F. C.	17.5.15	
294	" Bawley, E.	"	
6374	" Brooks, J.	"	
1807	" Cahill, W. J.	"	
5153	" Cole, T.	"	
4000	" Carnell, F. G.	"	
2326	" Dann, C. E.	"	
18459	" Daniel, V.	"	
7291	" Dumbrell, G. W.	"	
9803	" Funnell, E.	"	
19831	" Gale, R. C.	"	Reappointed.
3845	" Hewitt, W.	"	
3988	" Halcrow, B.	"	
3811	" Ilott, E.	"	
7646	" Jordan, J.	"	
7557	" Jones, W.	"	
14	" King, R. W.	"	
7553	" Rudge, J. E.	"	
20753	" Varney, H.	"	
3843	" Witford, C.	"	
5218	" Harding, H. E. B.	"	
4717	" Ainsley, J.	20.5.15	
2620	" Cornelius, F.	"	
1784	" Good, W. J.	"	
3647	" Hemmings, W.	"	
4729	" Lindsay, J. C.	"	
3094	" McFarlane, J.	"	
7687	" Prew, G. S.	"	
18562	" Coombes, A. E.	"	
4525	" Donaldson, G.	"	
4181	" Gillespie, T.	"	
613	" Wright, P.	"	
2650	" Kay, F.	"	
2513	" Smallridge, H.	"	
20244	" Jane, E. A.	"	
2251	" Cooke, B. H.	23.5.15	
4519	" Wylie, E.	"	
967	" Dinsdale, F.	"	
7781	" Wood, G.	24.5.15	
20801	" Flackett, L.	"	
7765	" Squirrell, F. G.	"	
6708	" Williams, H. M.	"	
20559	" Sims, E.	"	
20403	" Boulton, P.	"	
20106	" Worrall, A.	"	
7237	" Varnals, J.	"	
20499	" Fisher, A. A.	"	
20062	" Thacker, B.	"	
20278	" Webster, F.	"	
7241	" Austin, F. J. T.	"	
3668	" Bennett, L.	"	

Nursing Section—continued,

No.	Rank and Name	Date	Remarks
8760	Private McFarlane, J. ..	24.5.15	
5342	" Mason, A. ..	"	
8753	" Newman, F. S. ..	"	
20425	" Armstrong, J. H. ..	"	
2045	" Scott, J. ..	"	
8271	" Greengrass, B. J. ..	"	
6349	" Williams, C. C. ..	26.5.15	
2804	" Barnden, P. ..	6 6.15	
406	" Day, H. D. ..	"	
3283	" Foy, J. F. ..	"	
3239	" Hartley, S. ..	"	
18225	" Mabbott, E. C. ..	"	
19440	" Phillips, C. J. ..	"	
7501	" Stephens, R. ..	"	
638	" Waldron, D. T. ..	"	
20648	" Barker, A. L. ..	8.6.15	
9292	" Harrison, A. E. ..	"	
1441	" Beaman, W. ..	10.6.15	
6418	" Jones, H. ..	"	
2616	" Martin, B. J. ..	"	
6965	" Ness, E. R. ..	"	
2611	" Rosenthal, W. ..	"	
2621	" Greenfield, E. ..	"	
18897	" Blakeman, W. ..	11.6.15	
4912	" Beverley, A. ..	"	
20492	" Elder, R. G. ..	"	
2274	" Jones, H. C. ..	"	
10066	" Clarkson, A. ..	"	
19273	" Groessel, G. ..	"	
5199	" Kitts, H. H. ..	"	
7311	" Ranson, J. W. ..	"	
7220	" Shipley, F. S. ..	"	
20765	" Werry, T. J. ..	"	
2779	" Williams, G. H. ..	"	
3904	" Weale, J. ..	"	
19114	" Bindley, J. ..	"	
3956	" Frost, G. ..	"	
4022	" Shea, M. ..	"	
17494	" Peckham, F. ..	"	Reappointed.
3970	" Sutherland, R. ..	"	
6940	" Firth, H. ..	"	
4072	" Bentham, W. ..	"	
6323	" Raybould, B. T. ..	"	
2859	" Bannell, H. ..	"	
20438	" Stenhouse, T. ..	"	
20051	" Moore, F. ..	"	
4081	" O'Brien, P. F. ..	"	
9764	" Abbott, H. J. ..	"	
9115	" Blewitt, W. T. ..	"	
9455	" Brough, W. ..	"	
9146	" Byrne, M. ..	"	
9920	" Cousins, S. D. ..	"	
9415	" Frangleton, J. ..	"	
9573	" Grange, A. G. ..	"	
9148	" Gray, P. W. ..	"	
9364	" Lambert, G. T. ..	"	
953	" Ludlow, F. H. ..	"	
9458	" Murrell, F. G. ..	"	

Nursing Section—Continued.

No.	Rank and Name		Date	Remarks
9464	Private	Plimley, A. J. ..	11.6.15	
9453	"	Wright, J. W. ..	"	
9290	"	Read, E. G. ..	"	
8906	"	Smith, R. ...	"	
9112	"	Spain, F. J. G. ..	"	
9130	"	Tomley, S. B. ..	"	
7931	"	Whetham, S. ..	"	
8368	"	Whitbread, F. G. ..	"	
2670	"	Beston, W. J. ..	12.6.15	
18049	"	Bloomfield, O. G. ..	"	
5007	"	Godwin, R. A. ..	"	
19027	"	Higham, J. ..	"	
456	"	McMillan, T. ..	"	
640	"	Nixon, A. ..	"	
7825	"	Morrison, D. ..	"	
708	"	Owen, A. ..	"	
842	"	Parsons, S. ..	"	
2745	"	Martin, C. ..	"	
8717	"	Parsons, C. ..	14.6.15	
4455	"	Nice, T. J. ..	"	Reappointed.
1473	"	Ryan, J. ..	"	
9136	"	Williams, J. ..	"	
5618	"	Faichney, P. ..	"	
5268	"	Jones, L. H. ..	"	
1224	"	Murlis, T. G. ..	"	
9978	"	Bravington, R. J. ..	"	
4786	"	Squires, R. T. ..	"	
8440	"	Whyman, R. ..	"	
1503	"	Duncan, R. ..	"	
765	"	Power, J. ..	"	
8442	"	Smith, H. J. ..	"	
3968	"	Payne, T. ..	"	
8586	"	Spiers, A. E. ..	"	
8908	"	Welsh, J. ..	"	
5640	"	Hodgson, E. ..	17.6.15	
982	"	Mathewson, T. S. ..	19.6.15	
1572	"	Butterick, W. ..	"	
4496	"	Brown, H. H. ..	"	
5867	"	Paine, F. W. ..	"	
10025	"	Jones, W. ..	"	
10049	"	Edwards, A. ..	"	
10347	"	Gentle, M. ..	"	

ADVANCEMENT OF PRIVATES (CORPS PAY).

The following advancements in rate of Corps Pay will take effect from June 21, 1915 :—

TO BE ADVANCED TO THE THIRD RATE (AT 8D.).

As Orderlies.

No.	Name	No.	Name	No.	Name
2273	World, G. C.	5811	Buckby, C. G.	6432	Maynard, A. C.
6259	Attfield, C. G.	5771	Fennell, F.	6431	Rose, C. M.
12406	Branson, E.	17864	Gaylor, J.	17903	Bradley, T.
18719	Walker, S. F.	6326	Harris, F. W.	4524	Crosby, P.
19457	West, W. C.	5769	Rushmer, V. G.	1502	Bennison, F.
19092	Burton, L. W.	5509	White, W. C. H.	15580	Kapelle, L.
19072	Collins, L.	6913	Lord, J. H.	5329	Beer, H. G.
5105	Pawson, F.				

As Clerks.

No.	Name	No.	Name	No.	Name
5426	McLellan, H. ..	811	Freeland, E.		

TO BE ADVANCED TO THE FOURTH RATE (AT 6D.).

As Orderlies.

12	McNamara, T.	18562	Coombes, A. E.	18225	Mabbott, E. C.
6141	Compton, J. H.	4525	Donaldson, G.	7501	Stephens, R.
3447	Skelsey, J.	613	Wright, P.	638	Waldron, D. T.
4773	Younger, C. F.	2650	Kay, F.	18271	Lucas, F. C.
18590	Clark, W. H.	2513	Smallridge, H.	788	Sheldon, G. H.
19889	Kirk, A.	20244	Jane, E. A.	1441	Beaman, W.
17812	Litchfield, C.	2251	Cooke, B. H.	2616	Martin, B. J.
5776	Lewis, R. C.	4519	Wylie, E.	6965	Ness, E. R.
6102	Hawkins, C.	7107	Stanley, C. W.	2611	Rosenthal, W.
6607	Jacobs, E.	5571	Taylor, J. A.	2621	Greenfield, E.
18531	Tracey, E.	20585	Thomas, L. A.	17547	Burton, G. E.
2088	Clarke, J.	787	Clement, C.	1086	Gilliam, H.
5405	Megenia, P.	19214	Parker, S. S.	7114	White, S. J.
5487	Morris, C. O.	6872	Price, C. J.	7254	Martin, T. E.
19903	Newman, T. G. A.	2104	Smith, F. P.	18807	Kendall, J.
1547	Robinson, F. W.	4375	Tice, R.	8717	Parsons, G.
19043	Speers, W.	2741	Haynes, J. H.	4455	Nice, T. J.
1745	Songhurst, L. F.	2677	Sharp, A.	1473	Ryan, J.
7595	Salter, S.	5939	Green, W. J.	9186	Williams, J.
19229	Sullivan, J.	20440	Mallett, W. A.	5618	Faichney, P.
18168	Wood, A.	14845	Dormer, H. W.	5268	Jones, L. H.
5286	Welch, D.	19290	Horlock, A. E.	1224	Murlis, T. G.
5755	Wilkins, C. F.	7309	Knight, J.	1503	Duncan, R.
19741	Pearson, J.	1729	Short, W.	765	Power, J.
5312	Slater, R. G.	2804	Barnden, P.	8442	Smith, H. J.
998	Rawlings, W. J.	406	Day, H. D.	3968	Payne, T.
18244	Cowie, G. J.	3239	Hartley, S.	8586	Spiers, A. E.
12635	Allen, G.				

As Clerks.

6008	Weldin, J.	7460	Robinson, R. M.	19625	Wood, S. J.
7091	Copley, J.	409	Pearce, G. C.	1898	Daly, M.
7086	Morris, B. C.				

As Cooks.

17357	Wyles, F. E.	18214	Cellar, H. H.		
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The advancements are subject to the conditions laid down in paragraph 35, Standing Orders for the Royal Army Medical Corps.

REPOSTING TO CORPS.

The undermentioned rejoined the Corps on the dates specified :—
 18149 Quartermaster-Serjeant A. H. Godfrey, May 21, 1915, from Colonial Government.
 10511 Staff-Serjeant F. Morgan, June 16, 1915, from Territorial Force.

AMENDMENT—CORPS ORDERS.

In Corps Order dated October 12, 1914, under the heading "To be Staff-Serjeants," the promotion of No. 12535 Serjeant T. E. Oliver is antedated to August 20, 1914, with seniority next below No. 8962 Staff-Serjeant A. J. Canty.

ROYAL ARMY MEDICAL CORPS.—SPECIAL RESERVE.

The undermentioned Lieutenants (on probation) are confirmed in their rank:—

Ralph R. Thompson, David W. J. Andrews, Joseph H. Bayley, Arthur E. Richmond.

Dated April 3, 1915.—Patrick Cameron MacRae, Cadet of the Officers Training Corps.

Dated May 8, 1915.—John Galloway Hendry, M.B. (late Cadet Lance-Corporal, Glasgow University Contingent, Officers Training Corps).

Geoffrey B. Egerton, M.B.

Dated May 30, 1915.—William McElrea Snodgrass (late Cadet Lance-Corporal, Dublin University Contingent, Officers Training Corps).

Lieutenant (on probation) Norman Braithwaite resigns his commission, dated June 24, 1915.

TERRITORIAL FORCE.

ROYAL ARMY MEDICAL CORPS.

1st South Midland Mounted Brigade Field Ambulance.—The date of appointment of Lieutenant Robert W. Aitken, M.B., is September 17, 1914, and not as stated in the *London Gazette* of September 29, 1914.

2nd South Midland Field Ambulance.—Sidney John Sapey Bowd to be Quartermaster, with the honorary rank of Lieutenant, dated June 1, 1915.

3rd North Midland Field Ambulance.—Arthur Stanley Parsons to be Quartermaster, with the honorary rank of Lieutenant, dated May 13, 1915.

3rd Northumbrian Field Ambulance.—John Gray (late Major, 6th Battalion, The Durham Light Infantry) to be Major (temporary), dated March 20, 1915.

3rd Highland Field Ambulance.—Lieutenant Edwin A. Bell resigns his commission, dated April 20, 1915.

Welsh Divisional Sanitary Section.—Captain Robert Proudfoot, M.D., from Sanitary Service, to be Captain, dated June 22, 1915.

1st Welsh Field Ambulance.—Transport Officer and Honorary Lieutenant Charles B. Francis resigns his commission, dated June 25, 1915.

2nd West Lancashire Field Ambulance.—William Francis Young, M.B., to be Lieutenant, dated May 9, 1915.

West Lancashire Casualty Clearing Station.—Cadet Theodore Howard Somervell, from University of London Contingent, Senior Division, Officers Training Corps) to be Lieutenant, dated June 20, 1915.

3rd East Lancashire Field Ambulance.—Wilfred Edwin Rothwell, M.B., to be Lieutenant, dated April 26, 1915.

1st East Anglian Field Ambulance.—Captain William D. Watson from attached to Units other than Medical Units, to be Captain (temporary), dated June 20, 1915.

2nd East Anglian Field Ambulance.—Quartermaster-Serjeant Sidney Harold Ware, from 3rd East Anglian Field Ambulance, to be Quartermaster, with the honorary rank of Lieutenant, dated June 23, 1915.

East Anglian Divisional Sanitary Section.—Walter Francis Corfield, M.D. (late Captain, 2nd London Sanitary Company), to be Captain, dated June 20, 1915.

East Anglian Casualty Clearing Station.—Lieutenant Frederick W. Lewis (late Surgeon-Captain, South African Constabulary) to be temporary Captain, dated March 31, 1915; Major John H. Dauber, M.B., F.R.C.S., to be Lieutenant-Colonel, dated May 11, 1915.

1st Northern General Hospital.—Thomas Smirk Percival Parkinson, M.B., to be Lieutenant, dated June 7, 1915.

2nd Northern General Hospital.—The date of appointment of Lieutenant Harold D. Pickles, M.B., is May 13, 1915, and not as stated in the *London Gazette* of June 7, 1915.

3rd Northern General Hospital.—The undermentioned to be Lieutenants, dated June 25, 1915: Theodore Allen, M.B.; Gordon Fowler Stones, M.B.; William Wilfred Nicholas King, M.B., F.R.C.S. Edin.

1st Southern General Hospital.—The date of appointment of Quartermaster and Honorary Lieutenant Ralph FitzJames Sawyer is May 15, 1915, and not as stated in the *London Gazette* of June 1, 1915; William Kirkpatrick, M.D., to be Major, whose services will be available on mobilization, dated June 1, 1915; Albert Frederick Waters to be Quartermaster, with the honorary rank of Lieutenant, dated June 1, 1915.

3rd Southern General Hospital.—Captain Arthur G. Kewley, from 1st North Midland Field Ambulance, to be Captain, whose services will be available on mobilization, dated June 20, 1915.

4th Southern General Hospital.—Thomas Mitchell Jamieson to be Captain, whose services will be available on mobilization, dated June 4, 1915.

1st South Western Mounted Brigade Field Ambulance.—Staff-Serjeant Christopher Lambeth to be Transport Officer, with the honorary rank of Lieutenant, dated June 3, 1915.

2nd Western General Hospital.—Frank Chadwick, M.B., to be Lieutenant, dated May 1, 1915.

1st London (City of London) Field Ambulance.—Thomas Ainsworth Townsend to be Lieutenant, dated June 25, 1915.

1st London Casualty Clearing Stations.—Lieutenant Arthur H. Pemberton, from attached to Units other than Medical Units, to be Lieutenant, dated June 25, 1915.

2nd London (City of London) General Hospital.—Ashley Skeffington Daly to be Captain, whose services will be available on mobilization, dated June 25, 1915.

3rd London General Hospital.—Lionel Beale Clarke to be Lieutenant, dated May 26, 1915.

4th London General Hospital.—George John Jenkins, M.B., F.R.C.S., to be Captain, whose services will be available on mobilization, dated June 25, 1915.

TERRITORIAL FORCE RESERVE.

ROYAL ARMY MEDICAL CORPS.

Colonel John R. I. Raywood (late Assistant Director of Medical Services, South Midland Division) to be Colonel, dated June 22, 1915.

ATTACHED TO UNITS OTHER THAN MEDICAL UNITS.

Major Percival E. Barber is seconded for service with the Royal Army Medical Corps, dated June 1, 1915.

George Raymond (late Captain, 8th (Isle of Wight Rifles, "Princess Beatrice's") Battalion, The Hampshire Regiment) to be Captain, dated May 16, 1915.

Sanitary Service.—Captain Alexander C. Farquharson, M.D., from attached to Units other than Medical Units, to be Sanitary Officer, Northumbrian (Reserve) Division, dated April 2, 1915.

ROYAL ARMY MEDICAL COLLEGE.

LIST OF BOOKS ADDED TO THE LIBRARY DURING THE MONTHS OF
APRIL, MAY AND JUNE, 1915.

Title of Work and Author	Edition	Date	How obtained
The Medical Who's Who		1915	Library Grant.
Ganot's Elementary Treatise on Physics	18th	1910	" "
Whitla's Elements of Pharmacy, Materia Medica and Therapeutics	10th	1915	" "
Cunningham's Manual of Practical Anatomy. 2 vols.	6th	1914	" "
Clinical Examination of the Blood and its Tech- nique. By Professor A. Pappenheim. Trans- lated by R. Donaldson		1914	" "
An Index of Symptoms. By R. W. Leftwich, M.D.	5th	1915	" "
Practical Sanitary Science. By D. Sommerville, M.D.	2nd	1914	" "
Organic Chemistry. By Perkin and Kipping ..		1911	" "
The Extra Pharmacopœia. By Martindale and Westcott. 2 vols.	16th	1915	" "
Squire's Pocket Companion to the British Pharma- copœia	2nd	1915	" "
A Manual of Diseases of the Eye. By May and Worth	4th	1915	" "
Manual of Bacteriology. By Mins and Ritchie ..	6th	1913	" "
A Manual of Minor Surgery and Bandaging (Heath and Pollard). By H. M. Davies, M.D.	15th	1914	" "
A Text-Book of Inorganic Chemistry. By G. S. Newth		1912	" "
Spectrum Analysis applied to Biology and Medicine. By C. A. McMunn, M.D.		1914	" "
The Science and Practice of Dental Surgery. Edited by N. G. Bennett, M.A.		1914	" "
A Manual of Chemistry. By Luff and Gandy ..	5th	1915	" "
Elements of Surgical Diagnosis. By Sir A. Pearce Gould, K.C.V.O.	4th	1914	" "
Text-Book of Massage and Remedial Gymnastics. By L. L. Despard	2nd	1914	" "
A System of Operative Surgery. Edited by F. F. Burghard. Vols. iv and v	2nd	1914	" "
A System of Clinical Medicine. By T. D. Savill, M.D.	4th	1914	" "
A Text-Book of the Diseases of the Nose and Throat. By Wright and Smith		1915	" "
Electrical Treatment. By W. Harris, M.D. ..	2nd	1910	" "
Urgent Surgery. By F. Lejars. Translated by W. S. Dickie. Vol. i	3rd	1914	" "
An Index of Treatment. Edited by Hutchison and Collin	6th	1913	" "
The Blood: A Guide to its Examination, etc. By Gulland and Goodall	2nd	1914	" "
Hygiene and Public Health. By Parkes and Ken- wood	5th	1913	" "
Quantitative Chemical Analysis. By Clowes and Coleman	10th	1914	" "
Medical Diagnosis. By Latham and Torrens ..		1915	" "
The British Pharmacopœia		1914	" "
The Operative Treatment of Fractures. By Sir W. Arbuthnot Lane, Bart.	2nd	1914	" "
Ulcer of the Stomach. By C. Bolton, M.D. ..		1913	" "
Hernia: Its Etiology, Symptoms, and Treatment. By W. McAdam Eccles	3rd	1908	" "

LIST OF BOOKS ADDED TO THE LIBRARY—*Continued.*

Title of Work and Author	Edition	Date	How obtained
Manual of Surgery. By Rose and Carless	9th	1914	Library Grant.
A Text-Book of Military Hygiene and Sanitation. By Frank R. Kufer		1914	" "
Mutu's Short Manual of Analytical Chemistry. Edited by J. Thomas, B.Sc.	10th	1915	" "
A Treatise on Clinical Medicine. By W. H. Thomson, M.D.		1914	" "
A Manual of Pharmacology. By W. E. Dixon, M.D.	3rd	1913	" "
Local and Regional Anæsthesia. By C. W. Allen, M.D.		1914	" "
Forensic Medicine and Toxicology. By J. Dixon Manse, M.D. Revised by W. A. Brend, M.A.	5th	1914	" "
Chemical Pathology. By H. G. Wells	2nd	1914	" "
The Surgery of the Stomach. By H. J. Paterson		1914	" "
A Manual of Physiology. By G. N. Stewart ..	7th	1914	" "
A System of Surgery. Edited by Choyce and Beattie. Vol. iii		1914	" "
Abdominal Operations. By Sir Berkeley Moynihan. 2 vols	3rd	1914	" "
Pye's Surgical Handicraft. Edited by W. H. Clayton-Greene	6th	1912	" "
Diseases of the Skin. By James H. Sequeira, M.D.	2nd	1915	" "
Differential Diagnosis. By R. C. Cabot, M.D. 2 vols	3rd	1915	" "
A Text-Book of Pathology. By Adami and McCrae	2nd	1914	" "
The Essentials of Chemical Physiology. By W. D. Halliburton	8th	1914	" "
The Essentials of Physiology. By Bainbridge and Menzies		1914	" "
A Text-Book of Practical Therapeutics. By H. A. Hare	15th	1914	" "
Quain's Elements of Anatomy. Vol. ii. Part II.	11th	1914	" "
Handbook of Fevers. By J. Campbell McClure ..		1914	" "
The Anatomy of the Human Skeleton. By J. E. Frazer		1914	" "
Epidemic Cerebro-Spinal Meningitis. By A. Sophian, M.D.		1913	" "
Medical Electricity, Röntgen-Rays and Radium. By Sinclair Tonsey, A.M., M.D.	2nd	1915	" "
Food Products. By Henry C. Sherman		1914	" "
The Occupational Diseases, their Causation, Sym- ptoms, Treatment, and Prevention. By W. G. Thompson, M.D.		1914	" "
Genito-Urinary Diseases and Syphilis. By Edgar G. Ballinger, M.D.		1914	" "
Précis de Chirurgie de Guerre. Par E. Delorme ..		1914	" "
Précis de Microbiologie de Maladies Infectieuses des Animaux. Par Jules Courmont et L. Panisset		1914	" "
A Text-Book of Medical Entomology. By Patton and Cragg		1914	" "
Commonwealth of Australia. Quarantine Service. Service Publication No. 3. The History of Small-pox in Australia, 1788—1908. Compiled by J. H. L. Cumpston, M.D.		1914	Editor, Journal.

LIST OF BOOKS ADDED TO THE LIBRARY—Continued.

Title of Work and Author	Edition	Date	How obtained
Concerning Inoculation against Plague and Pneumonia and Experimental Study of Curative Methods. By W. M. Haffkine		1915	Editor, Journal.
8th and 9th Reports of the Henry Phipps Institute for the Study, Treatment, and Prevention of Tuberculosis. 2 vols.		1915	" "
Surgical Materials and their Uses. By A. McLennan, M.B., C.M.		1915	" "
Practical Tropical Sanitation. By W. A. Muirhead, Staff-Serjt., R.A.M.C.		1914	" "
United States, War Department; Office of the Surgeon-General. Bulletin No. 7, September, 1914. Studies in Röntgen-Ray Diagnosis with Special Reference to the Gastro-Intestinal Tract. By A. C. Christie, Captain Medical Corps		1915	" "
Municipal Council of Johannesburg. Report of the Medical Officer of Health, July 1, 1913—June 30, 1914		1915	" "
Military Report on the Colony and Protectorate of the Gambia		1915	Commandant's Office.
East Africa Protectorate. Annual Medical Report for the year ending December 31, 1913		1914	Commandant's Office.
The Clinical Anatomy of the Gastro-Intestinal Tract. By T. Wingate Todd, M.B.			University of Manchester.
Report of the Bombay Bacteriological Laboratory for the year 1913. By Major W. Glen Liston, C.I.E., I.M.S.		1914	Asst. Secretary to Govt. General Dept., Bombay.
The Fauna of British India. Mollusca. (Fresh-water Gastropoda and Pelecypoda). By H. B. Preston		1915	Secretary of State for India in Council.
Report from the Laboratory of the Royal College of Physicians, Edinburgh. Vol. xiii. Edited by J. J. Graham Brown and J. Ritchie		1915	Librarian, Royal Coll. of Physicians, Edinburgh.
Memoir on the Economic Geology of Navanagar State. By E. Howard Adye		1914	Presented by Surg.-Gen. Sir D. Bruce, C.B., F.R.S.
Report of the Sleeping Sickness Commission of the Royal Society. Numbers 14, 15 and 16		1914-15	" "
A Short Treatise on Anti-Typhoid Inoculation. By A. E. Wright, M.D.		1904	Presented by Major P. S. Lilian, R.A.M.C.
Round the Fountain. Published by the Editors <i>St. Bartholomew's Hospital Journal</i> .		1912	Presented by Major M. H. Gordon, R.A.M.C.

MARRIAGES.

GILL—DAVIDSON.—At St. Mary's U.F. Church, Edinburgh, on March 17, by the father of the bride, assisted by the Rev. B. Davidson, John Galbraith Gill, Captain R.A.M.C., son of R. P. Gill, Guntur, Madras Presidency, India, to Madge, daughter of the Rev. Geo. Davidson, B.Sc., 7, Bellevue Crescent, Edinburgh.

EGAN—WALL.—On July 1, at the Roman Catholic Church, Harrow. Captain W. Egan, R.A.M.C., to Norah Wall, The Croft, Hindes Road, Harrow.

EXCHANGES, &c.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd., 8, Serle Street, London, W.C., not later than the 22nd of the month.

A free issue of twenty-five reprints will be made to contributors of Original Communications, and of twenty-five excerpts of Lectures, Travels, and Proceedings of the United Services Medical Society.

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	8	0 8 0	0 1 3	4 0	1 3	3 6	0 9
	16	0 5 6	0 2 6				
50	4	0 9 6	0 4 6				
	8	0 4 0	0 1 8	5 0	1 9	4 0	1 0
	16	0 6 9	0 3 2				
100	4	0 12 0	0 5 3				
	8	0 5 6	0 2 9	6 6	3 3	5 6	2 0
	16	0 9 0	0 4 4				
200	4	0 16 9	0 6 9				
	8	0 8 6	0 4 0	9 0	6 3	7 6	4 0
	16	0 13 6	0 6 0				
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Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

All such Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the Author notifies at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," War Office, Whitehall, London, S.W.

Communications have been received from Colonel R. H. Firth, Lieutenant-Colonel D. Harvey, Major D. M. Greig, Major E. Finch, Major M. H. Gordon, Major A. H. Safford, Lieutenant Harold Mowat, Lieutenant H. Robinson, Lieutenant A. E. Mortimer Woolf, S. Delépine, Esq.

The following publications have been received :—

British: The Journal of Tropical Medicine and Hygiene, The Indian Medical Journal, The Medical Press and Circular, The Medical Journal of Australia, The Indian Medical Gazette, The Hospital, Tropical Diseases Bulletin (Sanitation Number), The Indian Journal of Medical Research, The Medical Journal of South Africa, The Sanitary Record and Municipal Engineering, Bulletin of Entomological Research, The Australian Military Journal, The Royal Engineers' Journal, The Lancet, St. Bartholomew's Hospital Journal, Guy's Hospital Gazette, The Practitioner, Annals of Tropical Medicine and Parasitology, The Quarterly Journal of Medicine, Red Cross and Ambulance News, The Medical Review, Tropical Veterinary Bulletin, The Army Service Corps Journal, The British Journal of Tuberculosis, Final Report of the Royal Commission on Tuberculosis, The Journal of State Medicine, Journal of the Royal Naval Medical Service.

Foreign: United States Public Health Service, The International Military Digest, Revista de Sanidad Militar, Bulletin de la Société de Pathologie Exotique, The Military Surgeon, Bulletin de l'Institut Pasteur, Le Caducée.

MANAGER'S NOTICES.

The **JOURNAL OF THE ROYAL ARMY MEDICAL CORPS** is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

The Annual Subscription is £1 (which includes postage), and should commence either on 1st July or 1st January; but if a subscriber wishes to commence at any other month he may do so by paying for the odd months between 1st July and 1st January at the rate of 1s. 8d. (one shilling and eightpence) per copy. (All subscriptions are payable in advance.)

Single copies can be obtained at the rate of 2s. per copy.

The Corps News is also issued separately from the Journal, and can be subscribed for at the rate of 2s. (two shillings) per annum, including postage. Subscriptions should commence from 1st July each year; but if intending subscribers wish to commence from any other month, they may do so by paying for the odd months at the rate of 2d. per copy. (All subscriptions are payable in advance.)

Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager, "Journal of the Royal Army Medical Corps," War Office, Whitehall, London, S.W., and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

It is requested that all Cheques or Postal Orders for Subscriptions to the Journal, Corps News, Reprints, etc., be crossed "Holt & Co.," and made payable to the "Hon. Manager, Journal R.A.M.C.," and not to any individual personally.

All communications for the Hon. Manager regarding subscriptions, etc., should be addressed to

THE HON. MANAGER,
"JOURNAL OF THE ROYAL ARMY MEDICAL CORPS,"
WAR OFFICE, WHITEHALL, S.W.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

JUNE, JULY, AND AUGUST, 1915.

War Office,
August 5, 1915.

The following dispatch has been received by the Secretary of State for War from the General Commanding the Mediterranean Expeditionary Force:—

General Headquarters,
Mediterranean Expeditionary Force,
June 12, 1915.

MY LORD,—In accordance with the closing paragraph of my dispatch of May 20, 1915, I have the honour to submit a list of the names of those officers, non-commissioned officers and men whose services I consider deserving of special mention, and I beg to recommend them to your Lordship's notice.

I have the honour to be,

Your Lordship's most obedient Servant,

IAN HAMILTON, *General.*

Commanding Mediterranean Expeditionary Force.

ARMY MEDICAL SERVICE AND ROYAL ARMY MEDICAL CORPS.

Colonel M. T. Yarr, F.R.C.S.I.

Field Ambulance.—Major C. H. Lindsay, M.D., 1st West Lancashire Field Ambulance (Territorial Force), 87th Field Ambulance; Lieutenant G. Davidson, M.D., 1st Highland Field Ambulance (Territorial Force), 89th Field Ambulance; No. 1368 Corporal J. W. Jones, 87th Field Ambulance; No. 1644 Private A. Cook, 87th Field Ambulance.

Australian Army Medical Corps.—Captain H. L. St. V. Welch; No. 1065 Staff-Serjeant H. Jackson; No. 997 Private L. W. Burnett.

1st Field Ambulance.—Captain C. E. Wassell; No. 611 Private Greig MacGregor.

2nd Field Ambulance.—No. 66 Lance-Corporal V. Cawley.

3rd Field Ambulance.—Captain D. MacWhae; No. 151 Lance-Corporal G. C. Farnham; No. 178 Private C. H. G. Rosser.

1st Australian Casualty Clearing Station.—Lieutenant-Colonel W. W. Giblin Major J. Corbin; No. 1403 Private M. D. Cowtan.

New Zealand Army Medical Corps.—Lieutenant-Colonel W. R. Pearless, V.D.; Captain G. Craig; No. 3/447 Lance-Corporal G. Steedman.

New Zealand Field Ambulance.—Major E. J. O'Neill; Lance-Corporal W. Singleton; No. 3/158 Private J. Comrie; No. 15/606 Private L. Crawford-Watson; No. 3/170 Private W. Heaver; No. 3/168 Private W. J. Henry.

War Office,
August 7, 1915.

The following are added to the list of names of those recommended for gallant and distinguished service in the Field in the dispatch from the Field Marshal Commanding

in Chief British Forces in the Field, dated May 31, 1915, which was published in the *London Gazette* on Tuesday, June 22, 1915.

Staff

Colonel E. G. A. Browne, Army Medical Service.

Munro Ambulance Corps.—Henry Jellett, M.D., F.R.C.P.I. (late Master of Rotunda Hospital, Dublin).

His Majesty the King has been graciously pleased to confer the Military Cross on the undermentioned Officers in recognition of their gallantry and devotion to duty whilst serving with the Expeditionary Force:—

Temporary Lieutenant John Marchbank Gillispie, M.B., Royal Army Medical Corps.

On May 24 and 25, 1915, at Ypres, he displayed conspicuous gallantry in ministering to the wounded under fire. He traversed the ground many times while under heavy shell and rifle fire, and dressed the wounded in the open. On the night of May 25 he went up to a wood near Bellegarde Farm and searched for wounded men close to the German trenches. In every action his gallantry has been conspicuous.

Temporary Lieutenant John Hart McNichol, M.B., Royal Army Medical Corps.

On May 24 and 25, 1915, at Ypres, with untiring energy and gallantry attended to wounded men under heavy rifle and shell fire, saving the lives of many men. On the night of May 25 he searched a wood near Bellegarde for the wounded, attended to them, and had them brought in. This wood was close up to the German trenches. He has shown the greatest courage in attending to the wounded in action.

With reference to the notification in the *London Gazette* of June 3, 1915 (pp. 5331 and 5332), the acts of gallantry and distinguished services at the Dardanelles for which the rewards of the Distinguished Service Order and the Military Cross respectively were granted by His Majesty the King, are as follows:—

COMPANIONS OF THE DISTINGUISHED SERVICE ORDER.

Major Eugene Joseph O'Neill, F.R.C.S., New Zealand Medical Corps.

On April 25 and 26, 1915, during operations near Gaba Tepe, for exceptionally good service, and exhibiting initiative and resource in command of a bearer sub-division.

Captain Arthur Graham Butler, Australian Army Medical Corps (attached 9th Australian Infantry Battalion).

During operations in the neighbourhood of Gaba Tepe on April 25, 1915, and subsequent dates, for conspicuous gallantry and devotion to duty in attending wounded under heavy fire, continuously displaying courage of a high order.

His Majesty the King has been graciously pleased to approve of the undermentioned rewards for gallantry and devotion to duty in the Field:—

AWARDED THE MILITARY CROSS.

Lieutenant William Kelsey Fry, Royal Army Medical Corps.

For conspicuous gallantry and devotion to duty at Festubert between May 16 and 18, 1915, while carrying out his work under heavy fire. He was himself wounded while attending to others.

Lieutenant David James Sheires Stephen, M.B., Royal Army Medical Corps.

For conspicuous gallantry and devotion to duty in attending to the wounded under heavy shell fire on several occasions, notably on the night of April 23 and on May 8, 1915. He has usually performed his gallant work single-handed, and by his cheerfulness and pluck has encouraged all around him.

ARMY MEDICAL SERVICE.

Surgeon-General Hayward R. Whitehead, C.B., F.R.C.S., is retained on the Active List, and to be supernumerary, dated July 14, 1915.

The undermentioned to be temporary Colonels:—

Dated May 14, 1915.—Lieutenant-Colonel Charles Stonham, C.M.G., F.R.C.S., Royal Army Medical Corps (Territorial Force).

Lieutenant-Colonel Percy C. Burgess, from South Eastern Mounted Brigade Field Ambulance, to be Assistant Director of Medical Services, 2nd Mounted (Reserve) Division, with the temporary rank of Colonel, dated July 5, 1915.

Dated July 12, 1915.—Lieutenant-Colonel William Thorburn, M.D., F.R.C.S., Royal Army Medical Corps (Territorial Force); Major George L. Gulland, M.D., Royal Army Medical Corps (Territorial Force).

Dated July 14, 1915.—Colonel Charles Snodgrass Ryan, M.B., Australian Army Medical Corps; temporary Lieutenant-Colonel Frederick D. Bird, M.B., F.R.C.S., Royal Army Medical Corps; temporary Major Sir Victor A. H. Horsley, Knt., M.B., F.R.C.S., Royal Army Medical Corps.

Colonel Henry M. Sloggett is retained on the Active List, and to be supernumerary, dated July 21, 1915.

ROYAL ARMY MEDICAL CORPS.

The undermentioned is granted temporary rank whilst employed with the Wharnccliffe War Hospital: As Lieutenant-Colonel:—

Dated April 1, 1915.—William James Nathaniel Vincent, M.D.

The undermentioned is granted temporary rank whilst employed at The Brook War Hospital: As Lieutenant-Colonel:—

Dated June 12, 1915.—John Benzeville Byles, M.B., F.R.C.S.

Dated June 16, 1915.—Captain Thomas Crisp English, M.B., F.R.C.S., Royal Army Medical Corps (Territorial Force), to be temporary Lieutenant-Colonel.

The undermentioned to be granted temporary honorary rank whilst serving with the Allied Forces Base Hospital, as Lieutenant-Colonel:—

Dated June 28, 1915.—Major William E. Miles, F.R.C.S., Royal Army Medical Corps (Territorial Force Reserve).

Dated July 5, 1915.—Major Sir Allan Perry, Knt., M.D., to be temporary Lieutenant-Colonel whilst in command of a General Hospital.

Dated July 6, 1915.—Temporary Honorary Lieutenant-Colonel G. S. Buchanan, M.D., to be temporary Lieutenant-Colonel.

The undermentioned to be temporary Lieutenant-Colonels:—

Dated July 6, 1915.—Lieutenant-Colonel Sir Ronald Ross, K.C.B., F.R.S., F.R.C.S., Royal Army Medical Corps (Territorial Force); Andrew Balfour, C.M.G., M.D., F.R.C.P.; Leonard Stanley Dudgeon, M.R.C.P.; William Henry Wilcox, M.D., F.R.C.P.

Lieutenant-Colonel Cecil A. Lane, M.B., is retained on the Active List, and to be supernumerary, dated July 11, 1915.

The undermentioned having ceased to be employed with the Australian Voluntary Hospital relinquish their temporary honorary commissions:—

Dated July 12, 1915.—Lieutenant-Colonel Sir Alexander MacCormick, M.D.; Captain Herschell L. L. Harris.

Dated July 19, 1915.—Temporary Major Sir David Hardie, Knt., M.D., to be temporary Honorary Lieutenant-Colonel whilst serving with the Australian Voluntary Hospital.

Dated July 23, 1915.—Thomas Percy Legg, M.D., F.R.C.S., to be temporary Lieutenant-Colonel.

Dated August 1, 1915.—Lieutenant-Colonel Robert J. Blackham, C.I.E., from the seconded list, is restored to the establishment.

Temporary Lieutenant Sydney D. Rowland to be temporary Major, dated December 17, 1915

The undermentioned to be Majors:—

Dated April 1, 1915.—Daniel Gillespie, M.D.; James Moir Mathieson, M.B.

Dated May 19, 1915.—Captain Graham S. Simpson, F.R.C.S., 3rd Northern General Hospital, Royal Army Medical Corps (Territorial Force).

Dated May 14, 1915.—Captain Sir Victor Alexander Haden Horsley, Royal Army Medical Corps (Territorial Force).

Dated May 23, 1915.—Percy Alfred Peall, M.B., to be temporary Major whilst employed with the County of London War Hospital.

The undermentioned are granted the temporary rank of Major whilst employed with the Beaufort War Hospital:—

Dated May 23, 1915.—Robert Atwood Beaver, M.D.

Dated May 26, 1915.—Thomas Mill, M.B., F.R.C.S.

The undermentioned to be temporary Majors:—

Dated June 10, 1915.—Hubert William Austin Burke, late Fleet-Surgeon, Royal Navy.

Dated June 12, 1915.—Arthur Laphorn Smith, M.D.

Dated June 15, 1915.—Leslie Haden Guest.

Dated June 16, 1915.—Albert Paling, M.B., F.R.C.S., to be temporary Major whilst employed with the County of London War Hospital.

Dated June 29, 1915.—Douglas Walter Hume, M.B., to be temporary Major whilst employed with the Norfolk War Hospital.

The undermentioned Captains to be Majors :—

Dated July 1, 1915.—Godfrey F. Rugg; John Fairbairn, M.B.; Robert G. Anderson, and to remain seconded; James H. Douglass, M.D.; Robert R. Lewis; Alexander L. Otway, M.B.; Charles H. Turner; Eugene C. Whitehead, M.B.; Walter F. H. Vaughan; Richard B. Hole, M.B.; Travis C. Lucas; George E. Cathcart; William Wiley, M.B.; Howard Harding, M.B.; John A. Turnbull; Montagu F. Grant, M.D.; David P. Johnstone; Edward H. M. Moore; Michael D. Ahern; Frederick J. Garland, M.B.; Alban A. Meaden; Robert J. Cahill, M.B.; Sidney C. Bowle; Harry B. Connell; Arthur S. Arthur, M.B.; William Byam, and to remain seconded; Charles Ryley; Patrick Dwyer, M.B.; Philip C. T. Davy, M.B.; Harry T. Wilson; Richard C. Hallows, M.B.; James H. Campbell, M.B.; George A. D. Harvey; Harold C. Winckworth; Harry W. Russell, M.D.; Harry C. Sidgwick, M.D.; Meurice Sinclair, M.B.; George R. Painton; Nelson Low; Alastair N. Fraser, M.B.; Robert H. L. Cordner; Herbert St. M. Carter, D.S.O., M.D.; Augustine T. Frost, M.B.; Kenneth A. C. Doig; Percy A. Lloyd-Jones, D.S.O., M.B.; Cecil R. Millar; John St. A. Maughan; Lionel V. Thurston; Arthur W. Gater; John P. Lynch.

James McCardie Martin, D.S.O., late Deputy Inspector-General, Royal Naval Medical Department, to be temporary Major, dated July 9, 1915.

The undermentioned are granted temporary honorary rank as stated whilst employed with the St. John Ambulance Brigade Hospital :—

Dated July 14, 1915.—Lieutenant-Colonel and Honorary Colonel C. J. Trimble, C.M.G., Territorial Force Reserve; Captain Sidney M. Smith, M.B., F.R.C.S., Royal Army Medical Corps, Territorial Force.

Dated July 24, 1915.—John Frederick William Silk, M.D., to be temporary Major.

Dated July 26, 1915.—John Mitford Atkinson, M.B., to be temporary Major.

Dated July 29, 1915.—Major Arthur E. Smithson, M.B., is retained on the Active List, and to be supernumerary.

The undermentioned to be Majors: Eliot Swainston, M.D.; Hamilton Irving, M.B., F.R.C.S.; William Forsyth Jones.

William Dewey Buncombe, M.D., to be temporary Major whilst serving with the City of London War Hospital, dated March 24, 1915. (Substituted for the notification which appeared in the *Gazette* of May 15, 1915.)

The date of appointment of Christopher Thackery Parsons, M.D., to a temporary majority whilst serving with the Fulham War Hospital is April 1, 1915, and not as stated in the *Gazette* of May 15, 1915.

The date of appointment of Frederick Sherman Toogood, M.D., to a temporary majority whilst serving with the Lewisham War Hospital is May 1, 1915, and not as stated in the *Gazette* of May 18, 1915.

Captain Sir Victor Alexander Haden Horsley, Royal Army Medical Corps, Territorial Force, to be temporary Major, dated May 14, 1915. Substituted for the notification which appeared in the *Gazette* of June 28, 1915.

Temporary Lieutenant Leonard B. Cane, M.D., Captain, Royal Army Medical Corps, Territorial Force Reserve, to be temporary Captain, dated April 16, 1915. (Substituted for the notification which appeared in the *Gazette* of April 15, 1915.)

Temporary Lieutenant Augustus W. Addinsell, M.B., to be temporary Captain, dated April 16, 1915. (Substituted for the notification which appeared in the *Gazette* of April 15, 1915.)

Bernard Hudson, M.D., dated April 23, 1915.

Temporary Captain Robert A. R. Wallace, having ceased duty with the Australian Hospital, relinquishes his commission, dated May 1, 1915.

The undermentioned to be temporary Captains :—

Temporary Lieutenant George B. Price, M.D., dated May 19, 1915.

Daniel O'Connell Finigan, late Captain, 7th (Service) Battalion, The York and Lancaster Regiment, dated May 24, 1915.

Captain Charles M. Drew, M.B., from the Seconded List, is restored to the establishment, dated June 1, 1915.

The undermentioned to be temporary Captains :—

Dated June 7, 1915.—George Alexander Douglas McArthur, M.B., Captain, Australian Army Medical Corps; John Shirley Steele Perkins, M.B., late Surgeon-Captain, 1st Exeter and South Devon Rifle Volunteers.

Dated June 14, 1915.—Arthur Burton, M.D., F.R.C.S., Temporary Lieutenant Henry MacCormac, M.B.

Dated June 15, 1915.—Arthur Ernest Marsack, late Surgeon-Captain, 1st Battalion, Royal West Kent Regiment, The Queen's Own.

Dated June 16, 1915.—Walter Duncanson Chambers, M.D., late Captain, 7th Battalion, The Royal Inniskilling Fusiliers.

Dated June 21, 1915.—Ernest Henry Starling, M.D.

Dated June 25, 1915.—Edward Percival Dickin, M.D.

Dated June 28, 1915.—Hugh Ransom Bramwell, M.B.

Dated July 1, 1915.—John Douglas Campbell White.

Dated July 2, 1915.—Colin Francis Frederick McDowall, M.D., is granted temporarily the honorary rank of Captain whilst serving at the Moss Side Military Hospital.

Dated July 3, 1915.—Captain Reginald Cecil Morley Hoare, South African Army Medical Corps.

Dated July 4, 1915.—Captain Robert J. B. Buchanan is placed temporarily on the half-pay list on account of ill-health.

Dated July 5, 1915.—James Cowan Woods, M.D., to be temporary Captain.

Dated July 1, 1915.—Oswald Challis, late Captain, Royal Army Medical Corps; James Richard Bibby, M.B., late Surgeon-Captain, Gloucestershire Royal Garrison Artillery (Volunteers).

Dated July 13, 1915.—Edward Reginald Tweed, M.D., late Surgeon Captain, 3rd Battalion, The Devonshire Regiment.

Dated July 15, 1915.—Robert Richard Wallace, M.B.

Dated July 20, 1915.—Robert Haldane Makgill, M.D.

George Dreyer to be temporary honorary Captain, dated July 12, 1915.

George Augustus Paul, M.B., is granted the temporary honorary rank of Captain whilst serving with the Australian Voluntary Hospital, dated July 24, 1915.

George Arthur Skinner, Home Hospitals Reserve, is granted the temporary rank of Captain, dated July 27, 1915.

The undermentioned temporary Lieutenants to be temporary Captains :—

Dated July 6, 1915.—Donald K. McDowell, C.M.G.; James G. Duncanson, M.B.

Dated July 7, 1915.—Anthony B. Bradford, M.B.; Herbert F. Woolfenden, M.D., F.R.C.S.; Wilfred G. Mumford, M.B., F.R.C.S.; Maurice Fitzmaurice-Kelly, M.B., F.R.C.S.; Mathew W. B. Oliver, M.B., F.R.C.S.

Dated July 9, 1915.—Sidney W. Woollett.

Dated July 14, 1915.—Hubert V. Leigh, M.B., late Captain, 1/5th Battalion (Territorial) the Welsh Regiment; Harry Fulham-Turner, late Captain Royal Army Medical Corps (Volunteers), Home District, the London Companies.

Dated July 15, 1915.—John H. Blakeney, late Surgeon-Captain, 1st Worcester and Warwick Artillery (Volunteers).

Dated July 18, 1915.—James J. Abraham, M.D., F.R.C.S.

Dated July 22, 1915.—Alic Phillips, late Surgeon-Captain, Army Medical Reserve of Officers; Alexander W. Robertson, late Surgeon-Captain, East Indian Railway Volunteer Rifles; Herbert T. du Heaume, late Captain, Royal Jersey Artillery Militia; Richard R. K. Paton, M.B.; Arthur A. Hudson, M.D., F.R.C.S. Edin., late Captain, Cape Medical Staff Corps.

Dated July 26, 1915.—Temporary Honorary Lieutenant Thomas G. Evans, M.D., to be temporary honorary Captain whilst serving with the Welsh Hospital, Netley.

Dated July 31, 1915.—Charles J. Edgar, M.D.

Dated August 8, 1915.—Frank R. Featherstone, late Surgeon, Royal Navy; Arthur Matthey, late Captain, British Guiana Militia Force.

The date of restoration to the establishment from the seconded list of Captain Charles M. Drew, M.B., is June 9, 1915, and not as stated in the *Gazette* of July 10, 1915.

Captain Walter Duncanson Chambers, M.D., from 7th (Service) Battalion, the Royal Inniskilling Fusiliers, to be temporary Captain, dated June 16, 1915. (Substituted for the notification which appeared in the *Gazette* of July 17, 1915.)

Frederic Francis German, late Surgeon-Captain, Royal Garrison Artillery (Volunteers), to be temporary Captain, dated June 20, 1915.

Major John Tait, from 3rd Highland Field Ambulance, to be Deputy Assistant Director of Medical Services, Highland Reserve Division, dated June 18, 1915.

Major Ralph B. Sidebottom, from attached to Units other than Medical Units, to be Deputy Assistant Director of Medical Services, Welsh (Reserve) Division, dated June 28, 1915.

Captain William H. Rowell, M.D., from the Territorial Force Reserve, to be Deputy Assistant Director of Medical Services, East Lancashire (Reserve) Division, dated July 11, 1915.

ROYAL ARMY MEDICAL CORPS.

The date of promotion of the undermentioned Captains is April 1, 1915, and not as previously stated:—

William F. McLean, M.B.; Robert M. Beath, M.B.; Thomas Walker, M.B.; William St. L. Dowse; William McN. Walker, M.B.; William McK. H. McCullagh, M.B.; Harry D. Rollinson, M.D.; Samuel R. Armstrong, M.B.; Thomas McEwen; John W. Gray, M.B.

The undermentioned Lieutenants to be Captains:—

Dated April 1, 1915.—Kingsmill W. Jones, M.D.; Sinclair Miller, M.B.; William A. Miller, M.B.; David M. Lyon, M.B.; John R. Hayman; Edward A. Wilson, M.B.; Arthur J. Brown; Philip S. Vickerman, M.B.; Ludwig S. B. Tasker, M.B.; Robert C. Dickson, M.B.; David Gilmour, M.B.; Harold W. Hills; Thomas S. Nelson; George R. Grant, M.B.; Joseph H. Ward, M.B.; Robert A. Hepple, M.B.; Joseph Walker, M.B.; Robert C. Aitchison, M.B.; Owen Wilson, M.B.; John Campbell, M.B.; Edmund T. H. Lea; Rowland B. Campion; Charles G. H. Morse; Malcolmson K. Nelson; Samuel Wright; Frederick Jefferson, M.B.; William Tyrrell, M.B.; William C. Davidson, M.B.; Alexander D. de Avray; Archibald M. McCutcheon, M.B.; William O. Tobias, M.B.; Allan C. Perry; Travis Hampson, M.B.; James Gossip, M.B.; John A. Pridham; Harry Evans, M.B.; Edmund T. Burke, M.B.; Harry C. Sinderson, M.B.; Sydney F. M. Cesari, M.B.; James Rafter, M.B.; Francis G. Foster, M.B.; Walter E. Elliott, M.B.; Herbert S. Griffith; Francis O. L. Moore, M.B.; William W. Wagstaffe, M.B.; Christopher Atkinson, M.B.; Douglas R. King, M.B.; Thomas I. Dun, M.B.; Hugh K. Ward, M.B.; Henry W. Maltby; Allan D. Fraser, M.B.; Basil W. Brown; Thomas J. Kelly, M.B.; John Taylor, M.B.; Henry H. Mulholland, M.B.; James J. Finlay, M.B.; Arthur P. Kennedy; Frederick L. Tulloch, M.B.; William Bird, M.B.; Howell Gwynne-Jones; Robert Montgomery, M.B.; George E. Pepper; William A. Letham, M.B.; Ernest F. W. Grelhier; Henry C. Rook; Donald J. Armour, F.R.C.S.; Owen Hairsine; Thomas O. Graham, M.D.; Thomas W. Wylie, M.B.; Alexander J. Gibson, M.B.; Raymond J. Clausen, M.B.; Andrew Picken, M.B.; Richard O'Kelly; Ewen S. Macphee, M.B.; John P. Huban, M.B.; Albert F. L. Shields, M.B.; Thomas M. Davis, M.B.; Campbell McN. McCormack, M.B.; Evan Davies, M.B.; John G. Ronaldson, M.B.; Robert L. Horton, M.B.; Hulert C. G. Pedler; Thomas Warrington; James C. Brash, M.B.; Alexander C. Jebb, M.B.; John A. O'Driscoll; Francis G. Macnaughton, M.B.; William McM. Chesney, M.B.; Ivan M. Pirrie, M.B.; William Walker, M.B.; John F. W. Sandison, M.B.; Patrick Walsh; Idris D. Evans, M.B.; Thomas W. Clarke, M.B.; Francis D. Annesley; Ian D. Suttie, M.B.; Henry C. Bazett, M.B.; Francis H. Guppy; Cyril J. A. Griffin, M.B.; Robert Ellis, M.B.; Charles D. M. Buckley, M.B.; John C. A. Dowse, M.B.; Harry E. B. White, M.B.; Frank Cook, M.B.; Francis G. A. Smyth; Clifford W. Sparks; Richard A. Preston, M.B.; Arthur B. Preston; Albert G. W. Compton; Charles H. Thomas; George V. Stockdale, M.B.; Ennis R. Chambers; George Dalziel, M.B.; Clark Nicholson, M.B.; David C. L. Vey; William A. N. Fox; John H. Beverland, M.B.; William Dunlop, M.B.; Harry E. Creswell; Henry K. V. Soltau, M.B.; William C. Mackie, M.B.; John L. Perceval; Richard E. Grandy, M.B.; Joseph C. A. McCalden, M.B.; William B. Alcock, M.B.; Charles F. Hacker, M.B.; James K. J. Haworth, M.D.; Lawrence H. W. Iredale, M.B.; James Purdie, M.B.; Maurice A. O'Callaghan; Cedric O. Shackleton, M.B.; Kenneth D. Murchison, M.B.; Osborne H. Mavor, M.B.; Archibald B. Mitchell, M.B.; Robert G. Bannerman, M.B.; Frederick J. H. T. Frere, M.B.; Alexander Glen, M.B.; John H. Magoveny, M.B.; Henry S. Baker; James C. Young, M.D.; Samuel K. Young, M.B.; Cyril J. B. Way; Ronald Stewart, M.B.; John W. McNee, M.B.; Frank P. Freeman; Eric K. Ryan, M.B.; George M. Roberts; Oswald C. S. Tandy, M.B.; James Y. Moore; Thomas C. Storey, M.B.; Walter V. Tothill; William Barclay, M.B.; John L. Kilbride, M.B.; Hugh G. Trayer, M.B.; Alfred L. Robertson, M.B.; William C. B. Meyer, M.B.; Charles N. Gover, M.B.; Andrew A. Fyffe; Albert A. Atkinson, M.B.; James R. McCurdie, M.B.; David C. Barron, M.B.; John W. Cannon, M.B.; Frederick G. Flood, M.B.; John A. W. Ebdon; Stanley Wickenden; William Fotheringham, M.B.; Austin Smith, M.B.; Harry Nield, M.D.; Thomas C. Kidner; Claude W. Treherne; Sidney W. Rintoul, M.B.; Clement Lovell, M.D.; Archibald W. Russell, M.B.; Frank Crosbie, M.B.; Francis A. Belam, M.B.; Ernest A. Dyson, M.B.; William F. Wood, M.B.; Edward R. Lovell; Bernard Goldsmith; Richard A. Stewart, M.B.; Frank S. Gillespie, M.B.; Robert R. G. Atkins, M.B.; Hamilton B. Goulding, M.B.; William E. Tyndall, M.B.; George S. McConkey, M.B.; Kenneth K. Drury, M.D.; Daniel

Dougal, M.D.; George A. Bridge, M.B.; Roger D. D. Brownson, M.B.; Charles A. McGuire, M.B.; Archibald J. Gilchrist, M.B.; Alexander J. Ewing, M.B.; William R. Blore, M.B.; Frederick A. Bearn, M.B.; Francis M. Taylor; Herbert M. Pope; Harold E. Rose; Richard N. O. Moynan, M.B.; Joseph B. Williamson, M.B.; Edward B. Marsh, M.B.; Frank G. Lescher; William T. Quinlan; Henry W. Evans, M.B.; Peter F. Ward; Morgan J. B. F. Burke-Kennedy; John V. L. Grant, M.B.; John W. Craw, M.B.; Francis Balkwill; William W. MacNaught, M.B.; Leonard J. Sheil, M.D.; Verner Wiley, M.D.; Cyril Armstrong, M.B.; Alexander B. Foott; Norman L. Joynt, M.B.; Thomas MacK. Miller; George G. Marshall, M.B.; Mark Aven, M.B.; Edmund B. Jones, M.B.; James Vallance, M.B.; Joseph A. L. Wilson, M.B.; Hugh S. Pemberton, M.B.; Geoffrey W. Wood, M.B.; Robert E. Bell, M.B.; Leonard F. Browne, M.D.; John C. Pyper, M.B.; James Lanigan; John P. Stallard, M.B.; Ernest Talbot, M.B.; John P. Litt, M.D.; John Paulley, M.B.; Henry B. Sherlock; Douglas G. Evans, M.B.; Timothy F. Hegerty, M.B.; William S. Haydock, M.B.; Richard P. Ballard, M.B.; John Le M. Kueebone, M.B.; William J. Adie, M.B.; Frank Griffith M.B.; William W. Shorten; Richard A. Austin; Alfred J. Clark, M.D.; Geoffrey Marshall, M.B.; Bernard Grellier; William S. Birch; Cuthbert H. Attenborough, M.B.; Harold J. S. Morton; Reginald H. Leigh; Edward S. Walls, Alfred M. Thomson, M.B.; James Davidson, M.B.; William Johnson, M.D.; Adiel E. H. Reid, M.B.; John H. Pendered, M.B., F.R.C.S.; James B. Scott, M.B.; John P. Mitchell, M.D.; Ronald G. J. McEntire, M.B.; Edward C. Linton; John P. Davies, M.B.; David W. John; Arthur L. Shearwood, M.B.; George R. Bruce, M.B.; Samuel W. M. Jones; Patrick McDonnell, M.B.; Bernard Murphy; William H. Wood, M.B.; Ernest M. Cowell, M.D., F.R.C.S.; Geoffrey N. Smyth; Peter W. Ransom, M.B.; Kenneth Biggs; John B. Minch, M.B.; Henry A. Harbison, M.B.; Frank R. Kerr, M.B.; Cyril Popham; David S. Badenoch, M.B.; Bertram Shires, M.B.; Oriel J. O'B. O'Hanlon, M.B., F.R.C.S.; Archibald Wilson, M.B.; William G. Shakespeare; Samuel D. G. McEntire; Griffith L. Jones; Joseph I. Lawson, M.B.; William Campbell, M.B.; Hugo R. Friedlander; Cassidy de W. Gibb; Philip J. Gaffikin, M.B.; Gerald G. Alderson, M.B., F.R.C.S.; Pensam Thornton; Bryan M. Tuke; William H. Cornelius; Frank Sykes; Leslie H. W. Williams; James Macallan, M.B.; Kingsley W. Lewis; Charles L. Balkwill; Robert G. Martyn, M.B.; Frederick V. Bevan-Brown; William McCombie, M.B.; William J. S. Ingram, M.B.

Dated April 2, 1915.—Matthew W. Paterson.

Dated April 5, 1915.—David Mackie, M.B.; David M. Marr, M.B.; Alexander L. Robb, M.B.

Dated April 6, 1915.—George A. Cole; Geoffrey S. Trower; Eric Catford; John McKerchar, M.B.; Eric W. Williams; Hugh G. Crawford; John E. Foley; James C. Spence, M.B.; Robert P. A. Kirkland, M.B.; Grantley D. Read; John E. Allan, M.B.; Arthur F. I. Patterson; Gerald P. Kidd; Trevor B. Heaton, M.B.

Dated April 7, 1915.—Richard F. Fagan; John H. Owen, M.B.; Richard P. Ballard, M.B.; Robert Hay, M.B.; William A. MacLennan, M.B.; John Cowan, M.B.; George H. C. Mold, M.B.; Frank H. Kennedy, M.B.; Gordon A. Hodgson; John F. Hill, M.B.; Hugh C. Storrie, M.D.; Thomas G. Shand; Alfred P. Smith; William H. Sheppard; Herbert Smith; Cecil J. Rogerson, M.B.; Patrick J. Corcoran, M.B.; Norman Cameron, M.B.; Charles F. Burton; John R. Caldwell, M.B.; John N. McIntosh, M.B.; Claude J. D. May; Stewart D. Robertson, M.B.; Richard H. Hodges; Thomas K. Boney, M.D.; Armande D. Child, M.B.; Jeremiah J. Magner, M.B.; Hector Smith, M.B.; John A. Ryle, M.B.; Kingsley L. O'Sullivan; George F. Clifton; Ernest F. Guy; Charles H. G. Penny; Thomas W. Martin, M.B.; James E. Black, M.B.; Edwin C. W. Starling; John S. Cocks; Gerald T. Mullally, M.B., F.R.C.S.; Ronald C. Ozanne, M.B.

Dated April 10, 1915.—Gerald F. P. Gibbons; Cyril Jacobs, M.B.; Lionel A. Lewis, M.B.; Neale L. Lochrane, M.B.; Walter A. Elliott, M.B.

Dated April 11, 1915.—Samuel A. Lane, M.D.

Dated April 12, 1915.—Colin Grant, M.B.

Dated April 16, 1915.—Francis A. Roddy, M.B.

Dated April 24, 1915.—Joseph W. P. Harkness, M.B.; Cecil L. Gaussen, M.B.; William S. Wallace, M.B.; Donald C. Scott; Harold A. Crouch; Wilfred B. Wood, M.D.; Herbert S. Milne, M.B.; William C. Hartgill; John S. Pooley; Quentin V. B. Wallace, M.B.; Gilbert A. Harvey, M.B.; William H. Nicholls; Charles A. Mason, M.B.

Dated April 25, 1915.—Arthur A. Smalley, M.B.

Dated April 30, 1915.—Henry Alcock, M.B.; John Kennedy, M.B.; Thomas F. Kennedy, M.B.

- Dated May 4, 1915.—John Cameron, M.B.
 Dated May 9, 1915.—John Stevenson.
 Dated May 10, 1915.—Maurice P. Inglis, M.B.; Kenneth A. M. Tomory, M.B.; Richard G. Waddy, M.B.
 Dated May 11, 1915.—Bertrand C. O. Sheridan, M.B.; Hugh A. Fawcett; John R. N. Warburton; Mathew McKnight, M.D.; John S. Sloper, M.B.; Arthur L. Anthony; John Deighton; Cromwell Gamble, M.B.; Herbert L. Garson; William K. Russell, M.B.; Charles G. Waddington; George W. Watson; Colin Wilson, M.B.; William A. Young; Henry S. A. Alexander, M.B.; James R. C. Mackintosh, M.B.; Harry N. Stafford; Wilfred W. Phillips, M.B.; Robert I. Sullivan, M.B.
 Dated May 24, 1915.—Ronald W. Duncan.
 Dated May 28, 1915.—Joseph P. Quinn, M.B.; John H. Sewart; James B. Fotheringham, M.B.; Cecil S. Staddon; Johann F. Van der Westhuyzen, M.B.; Andrew R. Ross, M.B.; Claude H. Fischel; Frederick W. Lipscombe; Harry P. Rudolph, M.B.; Robert W. S. Murray, M.B.; William H. Elliott, M.B.; Gifford T. Van der Vyver, M.B.; Allan B. Hawkins; Leo B. C. Marksmann, M.B.; Alexander G. S. Wallace, M.B.; William M. Dickson, M.B.; James L. McBean, M.B.; Frank M. Barnes; Douglas N. Macleod, M.B.; Thomas G. Fleming, M.B.; James Swan, M.B.
 Dated June 1, 1915.—Edgar L. F. Nash, M.B.; Richard P. Starkie.
 Dated June 2, 1915.—Ivan L. Waddell.
 Dated June 16, 1915.—David S. Martin, M.B.; Robert A. Anderson, M.B.; Thomas Sheedy; William M. Lansdale, M.B.; John G. Bennett, M.B.; Thomas P. Inglis, M.B.; Francis C. Lapage; George B. Hadden, M.B.; Hallows L. Addison; Francis J. Hallinan, M.B.
 Dated June 18, 1915.—Charles R. McIntosh, M.B.
 Dated June 30, 1915.—Gerald C. Dixon, M.B.
 Dated July 2, 1915.—Joseph H. Baird, M.B.; John J. D. La Touche, M.B.; John S. Dockrill, M.B.; Thomas H. S. Bell, M.B.; Henry P. Whitworth; Francis A. Duffield, M.B.; John J. Molvneaux, M.B.
 Dated July 4, 1915.—Wellington J. A. Laird.
 Dated July 6, 1915.—Robert P. Cormack, M.B.; George A. MacDonald, M.B.
 Dated July 16, 1915.—William D. Anderton, M.B.; Howell M. Williams; Frederic Sanders, M.B.; George S. Pirie, M.B.; Edwin J. Bradley, M.B.; Frank Oppenheimer, M.B.; James W. Wood, M.B.; George M. Scott, M.B.; Thomas Houston, M.D.; John Elder MacIlwaine, M.D.; Charles W. M. Hope, M.D., F.R.C.S.; Francis W. Goyder, M.B., F.R.C.S.; Rowland W. Collum; Percival T. Crymble, M.B., F.R.C.S.; Richard Galway Murray; Arthur Edwin Foerster; John Southerden Burn, M.B.
 The undermentioned to be temporary Lieutenants:—
 Dated May 11, 1915.—Tom Jays.
 Dated May 12, 1915.—Edward Ronald Welsh, M.B.; Howard Boyd Graham, M.B.; William Lincoln Robertson, M.B.; Arthur Francis Bell, M.B.
 Dated May 13, 1915.—Thomas Lloyd Kenion; Wilfred Michael Thunder, M.B.
 Dated May 14, 1915.—Peter Gorrie, M.D.; John Edwin Mackonochie Wigley, M.B.; John Ernest Hodson; Leonard James Pellew, M.B.
 Dated May 18, 1915.—Michael Joseph Gallagher, M.B.
 Dated May 20, 1915.—Richard Perrot Hadden, M.B.; Francis Robert Brown, M.B.
 Dated May 24, 1915.—Frank Tomisman Simpson, M.B.
 Dated May 25, 1915.—John Corcoran.
 Dated May 27, 1915.—Arthur Stanley Richmond, M.B.; Second Lieutenant Hugh James McCurrick, from Reserve of Officers, to be temporary Lieutenant (substituted for the notification which appeared in the *Gazette* June 21, 1915).
 Dated May 28, 1915.—James Gubbins Fitzgerald, F.R.C.S.Edin.; Le Baron Botsford Wilmot, M.D.
 Dated May 30, 1915.—James Graham Willmore.
 Dated June 1, 1915.—Andrew Hallidie, M.B., F.R.C.S.; Henry Montsarrat Rainsford; Arthur Geoffrey Owen, M.D.
 Dated June 5, 1915.—John Rhys Davies.
 Dated June 6, 1915.—William Samuel Ondeslowe Waring, M.B.
 Dated June 7, 1915.—Gerald Leo Kennedy, M.B.; Henry William Drew, F.R.C.S.; Leonard Newton Lee, M.D.; William Johnston MacNab, M.B.; Edgar Duke, M.D.; Henry Warner Smartt; John Hunter, M.B.; Angus Wylie, M.B.; Lionel Everard Napier; Douglas Kenneth Parkes, M.B.; John Pearson, M.B.; Wilfred Reginald Taylor; Peter Paul Wright, M.B.; Oswald Samuel Wraith, M.D., F.R.C.S.Edin.;

Harold Ettrick Moore, M.B.; Cyril Edward Harrison; James Lowe Barton Dixon, M.B.; George Brown Hillman; Evan Llewellyn Jenkins, M.B.; David Clark Laird, M.B.; Thomas Albert Hindmarsh, M.B.; James Walker Darling, M.B.; William Anderson, M.B.; Charles Henry Evers; Edward Davison Smith, M.B.; Wyndham Parker, M.B.; John Mills, M.B.; James Ernest Long, M.D.; Thomas Gill King; Vivian Gray-Maitland; Charles Stanser Bowker; Bernard Heynes Greensill; Henzell Howard Hummere; Alexander Joseph Vincent McDonnell; Ernest Francis Clowes; Augustus Charles Greenwood; John Cuthbertson Walker; Henry Roscoe Ibbotson; George Alexander Douglas McArthur, M.B.; Thomas Francis Keenan, M.B.; John Thomarson, M.D.; Jack Grenville Waine, M.B.; William James Dobson Smyth; Harold Widdrington Sykes, M.D.

Dated June 8, 1915.—Joseph Christopher Lavertine, F.R.C.S.I.; Frank Nangle Bury Smartt, M.B.; Farquhar William Matheson, M.B.

Dated June 9, 1915.—Harry Ellis Brawn, F.R.C.S.; Ishmael Edgar Bruneau, M.D.

Dated June 10, 1915.—Second Lieutenant Ronald Thomson Grant, from Reserve of Officers; William Francis Law, M.D., F.R.C.S.I.; Clarence Ham Sills; Francis Glancy O'Donohoe; Francis John Allen, M.B.; James MacRae; Alexander Forbes Ross, M.B.; Aubrey Aloysius O'Connor; Percy Peter James Stewart, M.B., F.R.C.S. Edin.; Ellis Campbell Bowden; Arthur Bryans; Edward Robert Ramsey Cheesman; Thomas Cadzow Findlater, M.B.; John Henry Davis, M.B.; William Scott Hall, M.B.; Denys Boubier Imbert Hallett, M.D.; Michael John Hackett, M.B.; David John Lewis; George Francis May, M.D.; Frederick Juland Rawlinson, F.R.C.S.; Peter Latimer Leith Craig, M.B.; Harry Oswald Smith, M.B.; James Robert Karran Thomson; Walter Forsyth Hare, M.B.; Evan John Griffiths, M.B.; Henry Cecil Beasley; Horace Herbert Kendrick; David James McLeish; Lieutenant Ronald Thomson Grant, from 4th Battalion (Extra Reserve), Princess Louise's (Argyll and Sutherland Highlanders), (substituted for the notification which appeared in the *Gazette*, July 10, 1915); Henry Marcus Culpepper Green, M.B.; Edward Hamilton Black, M.B.; Joseph Vincent M. Bryne.

Dated June 11, 1915.—Abraham Hipwell; Henry Smurthwaite, M.D.; Watkin Watkins; Henry Goff Kilner, M.B.

Dated June 12, 1915.—Seymour Richard Glead; Harold Stewart Casson Darbyshire; Robert Nairn, F.R.C.S.; Arthur Beresford Jones, M.B.

Dated June 14, 1915.—James Massey Keegan, M.B., F.R.C.S.I.; Harry Bertram Walker, M.B.; Thomas Edward Cottu; Charles Henry Corbett, M.D.; Henry Ulrich Leembruggen; Arthur John Turner, M.B.; Walter Joseph Harper; Stewart Hodgson, M.B.; James Eric Paterson, M.B.; William George Simpson Thomson, M.B.; Arthur St. John Bateman; Frederick Copeland; Henry Francis Townshend Chambers; Matthew Starling Philson.

The appointment to a temporary Lieutenantcy of Trevor H. Fowler, which appeared in the *Gazette* of June 15, 1915, is antedated to May 15, 1915.

Dated June 15, 1915.—Harold Victor Walsh, M.B.; William West Linington, F.R.C.S.; Robert Vernon Girard Monckton, M.D.; George Vert Thomson McMichael, M.B.; Cyril Banks, M.B.; James Dwyer Ryan; Alexander Gladstone Christian, M.D.; Alexander O'Flaherty; Victor Blacker Kyle, M.D.; James Alphonsus Vincent Mathews; Robert Buchanan Forbes McKail, M.B.; Thomas Augustine O'Brien, M.B.; Alfred Alexander Webster Petrie, M.D., F.R.C.S. Edin.; Robert Rennie, M.B.; Edward James Selby; William Robertson Logan, M.D.; Alexander Grant, M.B.; Theodore Chalmers, M.B.; George John Brown Candler-Hope, M.B.; James William Edington, M.B.; Archibald Gillespie, M.D.; William Owen Travis, M.D.; Harold Evan Thomas, M.B.; Thomas Richard Earls-Davis, M.B.; Charles Edward Dolling, M.B.; Edward Allan Wilson, M.D.; George Kenworthy Thompson, M.B.; Charles Anderson Meaden; Albert Edward Hutton; John Appleyard, M.B.; John Lamont; John Nicholas Donnellan, M.B.; Cyril Howard Shearman, M.B.

The name of Richard Henry Rigby is as now described and not as stated in the *Gazette* of June 15, 1915.

Dated June 16, 1915.—Charles Edward Droop, M.B.; Alexander Carruthers Bryson, M.B.

Dated June 17, 1915.—Robert Nicoll, M.B.; Jeffrey Alexander Amherst Orlebar, M.B.; John Sutton Webster, M.B.; Edward Spencer Holloway, M.B.; James Taylor Grant, M.B.; Oswald Clive Graeme Shields, M.B.; Frederick Grone, M.D.

Dated June 18, 1915.—George Henry Roberts, M.B.; Donald Bayne Crerar, M.B.; George Lestock Thornton; George Herbert Brown, M.D.; William Godfried Lorenz Wambeck; John McCallum Lang, M.B.; Gerald Spencer Coghlan; John Brodie Boyd, M.B.; Walter Scott, M.D.

Dated June 19, 1915.—James Ferguson; Hugh George Hobson.

Dated June 20, 1915.—Aubrey Scott Gillett; Ralph Vincent, M.D.; Alfred Martin Roome; Alexander David Crawford, M.B.; Thomas Forrest Craig, M.B.; Theodore Bell, M.D.; Thomas Llewellyn Davies; Arthur Hurrell Style, M.D.; Harold Ernest Rawlence, M.B., F.R.C.S.Edin.; Hugh Hamilton Serpell; Angus Campbell, M.B.; Charles Averill, M.B.; David Garrick Wishart, M.B.

Dated June 21, 1915.—John Edridge Healey, M.B.; Edwin Wallace Goble; Alexander Greig Anderson, M.D.; David Rees Jones; Francis Vincent Hanratty; Robert William Lessel Wallace, M.D.; Arthur Charles Rowsell, M.B.; William Stuart Thacker, M.D., F.R.C.S.Edin.; Henry Bartlett Shillingford; Thompson Ferris Wilson, M.B.; John James Harrower Ferguson, M.B.; Donovan Blaise Pascall, M.B.

Temporary Lieutenant Donovan B. Pascall, M.B., having ceased to serve with the British Red Cross Hospital, Netley, relinquishes his commission, dated June 21, 1915.

Dated June 22, 1915.—James Duncan Hart, M.B.; John Francis Joseph Herbert, M.B.; Walter Fell, M.D.; Frank Irvine MacKinnon, M.B.; Robert Louis O'Grady; Louis Stanislaus O'Hare; Andrew Francis Honyman Rabagliati, M.D., to be Honorary Lieutenant whilst serving with No. 4 British Red Cross (Sir Henry Norman's) Hospital.

Dated June 23, 1915.—Thomas Conrad Reeves; Thomas Francis Devane; Richard Le Geyt Worsley.

Dated June 24, 1915.—Frederick Gustave Wooding Deane, F.R.C.S.Edin.; Cyril George Galpin, M.B.; Robert Bruce-Low; James Clark McKerrrow, M.D.; Naughton Dunn, M.B.; John William Ernest Graham.

Dated June 25, 1915.—Harry Percival Gaston; Robert Sterling, M.B.; John Samuel Ernest Selby; William Dunmore Murray, M.B.; Thomas Peacock Seymour; Charles Arthur Purnell, M.B.; Ernest King Gawn, M.D.; David Gillespie, M.D.; James Wilson Pettinger, M.B.; Bernard Bradley Gough; Henry Moncrieff MacGill, M.D.; William Stanley Finch; Robert James Harris; Harry Foster Holmden, M.B., F.R.C.S.Edin.; Charles George Monro, M.B.; Herman Gerald Dresing; Cuthbert Ede, M.B.; Joseph Harvey Kemp Sykes; Andrew Leslie Edmund Filmer Coleman, M.D.; Charles Kenneth McKerrrow, M.B.; John Thomas Myles, M.D., F.R.C.S.I.; Edgar Faulks; Henry John Hoyle, M.B.; John Irwin Arnold; Arthur Francis Michael Mullaue, M.B.; Francis Patrick Kennedy; Vincent Edgar Badcock, M.D.; Robert Fell; John Joseph Lawrence Ferris, M.B.; Walter Henderson Scott; Hans Hill Sloane; Ernest Rowland Fothergill, M.B.; John Barton Thompson Keswick, M.B.; Lennard Game; Wilson Trevor Williamson; William MacLeod, M.B.; Alexander Mathieson, M.B.

Dated June 26, 1915.—William Stevenson Brown Hay, M.B.; Duncan Fletcher; Douglas Allan Donald, M.B.; James Arthur Balfour Carson.

Dated June 28, 1915.—Julian Landman, M.D.; Harry Livesey Dixon, M.D.; Thomas Loudon Fleming, M.D.; Samuel McCormac, M.B.; Charles Barron Wainwright, M.B.; Thomas William Buckley, M.D.; David Thomas, F.R.C.S.; Frank Wiseman Doak; Roland Arthur Hertslet Fulton, M.B.; Harold Weightman Sinclair, M.D.; Noel Stewart Whitton, M.B.; Charles Newberry Cobbett, M.D.; Cecil Charles Worster-Drought, M.B.

Dated June 30, 1915.—Harry Kirkland-Whittaker, M.D.

Dated July 1, 1915.—Henry Cunningham Mulholland, M.B.; Daniel Conway McArdle, M.B.; Robert Douglas Lawrie, M.B.; Reginald John Hands Cox, M.B.; Joseph McGrath, M.B.; Robert Lawson Crabb, M.D.; Frank Longstaff Apperley; Francis Murphy; Joseph James Gawler Pritchard; Francis Samuel Brook Fletcher, M.B.; Herbert Henry Sampson, M.B., F.R.C.S.; Stephen Hugh Pitcairn; Thomas Marlin, M.D.; Claud Francis Fothergill, M.B.; Alexander Shearer, M.B.; Robert Warden Valentine, M.B.; Ernest George Best Starkie, M.D.; Alexander Hope Walker, M.D.; Herbert Devas Everington, M.B.; John Fearby Campbell Haslam, M.B.; Aidan Gordon Wemyss Thomson, M.B.; William John Robertson, M.B.; Robert Clark, M.B.; Herbert Edward Humphrys, M.B.; William George Fee; Patrick Joseph Barry; Ernest James Chambers; William Campbell, M.B.; Walter Spencer Badger, M.B.; Peter Daly; Arthur Herbert Flannery, M.B.; Joseph White O'Brien, M.B.; John Pinkerton Duncan, M.B.; Roderick Murdoch MacLennan, M.B.; Lewis Potter Black, M.B.; Archibald Trevor Moon, F.R.C.S.; William Garrow Shand, M.B.; Herbert Henry Warren, M.B.; Allan Gordon Graham; Hugh Quigley, M.B.; Alfred Ernest Townley, M.B.; Ian Agilvil, M.B.; Newman Frederick Norman; William Henry Wishart, M.B.; Harold Gray; Henry Gilbert Wood-Hill; Archibald Ramsay, M.B.; James Pirie, M.D.; Alexander Minter Watts, M.D.; Frederick William Lyle, M.D.; William Sutton Pratt, M.D.; John Ernest Alfred Underwood; Lieutenant

Ian Ronalds MacLeod, from 8th (Reserve) Battalion, The Queen's Own Cameron Highlanders; **Arthur Montgomery Marsh Roberts**, M.B.; **Denis Salmon Page**; **Walter Annesley Thompson**; **William Henry Compton**; **John Percy Musson**, M.B.; **George Beresford Noble Flanagan**; **Hugh Craigie Gibson**, M.B.; **Robert Marshall**, M.D.

James Patrick Smyth Dun, M.B., to be temporary Lieutenant whilst serving with the British Red Cross Hospital, Netley.

Temporary Lieutenant **John J. Johnson** relinquishes his commission on account of ill-health, dated July 1, 1915.

Temporary Lieutenant **John C. Venniker**, M.D., F.R.C.S. Edin., relinquishes his commission on account of ill-health, dated July 1, 1915.

Dated July 2, 1915.—**Robert William Griffin**; **James Millard Barnes**; **Gerald Beaumont Ash**; **Ernest Sutton Tait**; **Thomas Wilson Caskey**; **Stanley Joseph Frederick Webb**; **Reginald Manton King**; **Beattie Lyons**, M.B.

Dated July 3, 1915.—**John Victor Holmes**, M.B.; **Archibald Tisdall Johns**, M.D.; **Archibald Graydon**; **William Rous Kemp**; **Oscar Rudolph Percy Muller**, M.B.; **Stephen Smith**.

Dated July 4, 1915.—**Graham Wilson Christie**, M.B.; **James Bayley Butler**, M.B.; **Dudley Jeaffreson**; **Daniel Steel Macbean**, M.B.; **Thomas Divine**, M.D.; **William Edward Peck**, M.B.; **Colin Gordon**, M.B.; **Richard Hugh McGillycuddy**; **Thomas James Golding**; **Ronald MacDonald**, M.D.; **George Henry Rodolph**; **Ernest Llewelyn Davey**; **Archibald Buchanan Laidlow**; **Ernest Alfred Walker**.

Dated July 5, 1915.—**Sydney James Kaye**; **Arthur Ridges Rowe**; **Harold Seymour Douthwaite**; **Robert Hodgson**; **George Blacker Elliott**; **Joseph Corbett Muir**, M.D.; **Basil Lockhart Livingstone-Learmouth**, M.B.; **Wellesley Roe Allen**, M.B.; **Theo Jenner Hooper Hoskin**; **Alexander Robb-Smith**, M.B.; **Robert Wilson Sutherland**, M.B.; **John Lunn**, M.B.; **Thomas McCosh**, M.B.; **Ewen George Macpherson Gilchrist**, M.B.; **Christian Philip Sydney Allingham**; **John Daly Nicholas**; **James Cowan Woods**, M.D.

Dated July 6, 1915.—**Robert Dendy Sadler**; **Joseph Frederick Jopling**; **Henry Harper Hulbert**; **John Patrick Shaw**.

Dated July 7, 1915.—**William Lumsden**, M.B.; **James Brown**, M.B.; **Henry Faithful Smith**, M.D.; **Alexander Butchart MacArthur Thomson**, M.D.; **Robert Briffault**, M.B.; **Ernest Harding Freeland**, F.R.C.S.; **William Harrison Thresher**, M.B.; **Charles Marshall Dickinson**; **Isaac Whitla Corkey**, M.B.; **John Edward Pellow**, M.B.; **George Robert Gray**, M.B.; **Brian Bentley Metcalfe**; **William Browne**; **Richard Craven**, M.B.; **Donald Duncan**, M.B.; **Frederick Crichton Matthew**, M.D., F.R.C.S. Edin.; **Arthur King**, M.D.; **William Clow**, M.B.

Dated July 8, 1915.—**Thomas Fleming Stevenson Fulton**, M.B.; **William Thomas Mills**; **Peter Christian Lornie**, M.B.; **George Redpath**, M.B.; **Charles Voughton Knight**, M.D.

Dated July 9, 1915.—**William Edward Stevenson**, M.B.; **Edgar Nesbitt Coutts**, M.B.; **Donald John Gair Johnston**, M.B.

Dated July 10, 1915.—**Hermann Rogers-Tillstone**, M.D.; **Breadalbane Blacklock**, M.D.; **Norman McConnell Boyce**, M.B.; **Joseph Aloysius Mescall**; **Joseph Victor Cope**, M.B.; **Andrew Climie**, M.B.; **David Whyte**, M.B.; **Frederick Arthur John Robertson Brooke**; **Alexander McEwan**, M.B.; **Murray Babington Stuart**, M.B.; **William Murray Thomas**; **Charles James West**, M.D.; **Owen Felix McCarthy**.

Second Lieutenant **John F. Cruise**, half-pay list, retires on retired pay, dated July 10, 1915.

Temporary Lieutenant **Donald Wingrave Duncan**, from Royal Army Medical Corps, to be Lieutenant, dated July 10, 1915, with seniority as from November 24, 1914.

Dated July 12, 1915.—**Geoffrey Allen Upcott Gill**, F.R.C.S. Edin.; **John Frederick Wolseley Leech**, M.D.; **Cecil Francis Nicholas**.

Dated July 13, 1915.—**Ernest Douglas Wolff**; **Hamilton William Dyke**, M.B.; **Harold West Hodgson**; **Charles Lawrence Mackaness**; **Oliver John Francis Campbell Greenidge**, M.B.; **Frederic William Watkyn-Thomas** to be temporary Honorary Lieutenant.

Dated July 14, 1915.—**William Franklin O'Regan**, M.B.; **Edward Charles Cunningham**; **Hubert Hodge**, M.B.; **Alexander Gibb Glass**, M.D.; **Charles Devereux Pile**, M.B.; **Henry Croly**, M.D.

The appointment to a temporary Lieutenantcy of **James D. Adamson**, M.D., which appeared in the *Gazette* of July 14, 1915, is antedated to June 14, 1915.

Dated July 15, 1915.—**Stanley Walter Williams**; **George Raphael Binck Purce**, M.B.; **Albert Waldegrave Mitchell**; **James Kennedy Small**, M.B.; **John Hegarty**;

William Hutcheson, M.D.; William Henry Norman Bright, M.B.; Reginald Whiteside Statham; Arthur Frederick Gamble Codd, M.B., F.R.C.S.; Joseph Cunningham Watson, M.B.; David Anthony Birrell; Malcolm Ogden Cruickshank; Frederick Henry Allfrey, M.B.; William Russell, M.B.; William Hodge McWalter, M.B.; Thomas Dryden Moffat, M.B.; Aloysius Marie Joseph Halligan; James Brown Sim, M.B.; Alexander Henderson Cran, M.B.; Conolly Stouppe Miller, M.B.; Francis Christopher Tibbs; Walter Wiglesworth; David Wilson, M.D.; Cyril Wace, F.R.C.S.; Harry George Cleave Reeve.

Temporary Lieutenant James Smith, M.B., relinquishes his commission, dated July 16, 1915.

Dated July 21, 1915.—George Matthews.

Dated July 22, 1915.—Arthur James Horniblow; John Sidney Smith.

Angelo Matteo Crabtree, F.R.C.S., is granted temporarily the honorary rank of Lieutenant whilst serving with the New Zealand War Contingent Hospital, dated July 24, 1915.

Dated July 26, 1915.—Lancelot Horseley; Colin McKean Craig, M.D.; John McElrath Gibson, M.D.; Arthur Hubert Watson, M.B.; Andrew Hegarty; George Oscar Jacobsen; Geoffrey Plumptre Wilson; Joseph Wallace, M.D.; Archibald Chalmers, M.B.; Charles Mitchell, M.B.; John Simpson, M.B.; Anthony Bridges Jesser Coope, M.B.; John Theobald Murphy, M.B.; Eric Underhill, M.B.; Frederick James Purcell Daly; Stephen Forrest, M.D.; James Fleming Dow, M.D.; Bruce Malaher; Percy James Kelly, M.B.; Harry Fleming Hutchinson, M.B.; Andrew Campbell Keay, M.B.

Dated July 27, 1915.—John White; Charles Baird Macdonald, M.B.

The undermentioned to be Quartermasters:—

Dated May 26, 1915.—Charles Grayson to be temporary Quartermaster, with the honorary rank of Lieutenant whilst employed at the Stoke-upon-Trent War Hospital.

Dated June 12, 1915.—Edward Caffyn to be temporary Quartermaster, Home Hospitals Reserve, with the honorary rank of Lieutenant.

The undermentioned to be temporary Quartermasters, Home Hospitals Reserve, with the honorary rank of Lieutenant:—

Dated June 12, 1915.—Percy John Sebright.

Dated June 15, 1915.—Thomas Moody to be temporary Quartermaster, with the honorary rank of Lieutenant.

Dated June 19, 1915.—William Lorraine to be temporary Quartermaster, with the honorary rank of Lieutenant.

Dated June 21, 1915.—John Edwin Chancellor; William George Butcher to be temporary Quartermaster, Home Hospitals Reserve, with the honorary rank of Lieutenant.

Dated June 22, 1915.—Enoch Kirk to be temporary Quartermaster, with the honorary rank of Lieutenant.

Dated June 23, 1915.—Harry Edward Burn to be temporary Quartermaster, with the honorary rank of Lieutenant.

Dated June 26, 1915.—John Ritchie to be temporary Quartermaster, with the honorary rank of Lieutenant.

Dated June 28, 1915.—Joseph Henry Withy to be temporary Quartermaster, Home Hospitals Reserve, with the honorary rank of Lieutenant.

To be Quartermaster with the honorary rank of Lieutenant:—

Leslie Egerton Hine.

Dated July 1, 1915.—George Gerhold to be temporary Quartermaster, Home Hospitals Reserve, with the honorary rank of Lieutenant.

Dated July 3, 1915.—Charles Henry Edwards to be temporary Quartermaster, with the honorary rank of Lieutenant.

Dated July 6, 1915.—Martin William Colahan to be temporary Quartermaster, with the honorary rank of Lieutenant.

The undermentioned to be temporary Quartermasters, with the honorary rank of Lieutenant:—

Dated July 7, 1915.—Albert Edward Hanrahan; John William Piercy; Thomas James Cross.

The undermentioned to be temporary Quartermasters, Home Hospitals Reserve, with the honorary rank of Lieutenant:—

Dated July 6, 1915.—Frederick Hope Oldham.

Dated July 7, 1915.—Albert William Journet.

Dated July 8, 1915.—Ernest John Parslow.

Dated July 9, 1915.—James Augustus Sanger.

Dated July 10, 1915.—Henry Ernest Humphrey.

Dated July 11, 1915.—Harry Rollins Patenall.

Home Hospitals Reserve, with the honorary rank of Lieutenant.

Dated July 12, 1915.—Alec Turner to be temporary Quartermaster, with the honorary rank of Lieutenant; William Carroll Hastings.

Dated July 15, 1915.—George Mayell; William Henry Pugh to be temporary Quartermaster, Home Hospitals Reserve, with the honorary rank of Lieutenant.

Dated July 19, 1915.—Charles Matthew Blanchette.

Dated July 20, 1915.—William Gough.

The undermentioned to be temporary Quartermasters, with the honorary rank of Lieutenant;—

Dated July 23, 1915.—George John Miller Westfield; John Thomas Fry.

Dated July 26, 1915.—Charles Elliot.

Dated July 30, 1915.—Temporary Quartermaster and Honorary Lieutenant George Rose relinquishes his commission on account of ill-health.

The appointments to commissions for service in the Duchess of Westminster's War Hospital; Welsh Hospital, Netley; Red Cross Hospital, Netley; Australian Voluntary Hospital and Liverpool Merchants Mobile Hospital; with the exception of Lieutenant-Colonels W. L'E. Eames and H. S. Peeke, should have been described as temporary honorary commissions, and not as in the various *Gazette* notifications.

TERRITORIAL FORCE.

ROYAL ARMY MEDICAL CORPS.

1st London (City of London) General Hospital.—Lieutenant Arnold W. Stott is seconded for duty with a General Hospital overseas, dated May 13, 1915; John Duncan Legge Currie to be Lieutenant, dated July 9, 1915; Captain Thomas J. Horder is seconded, dated June 28, 1915; Neville Samuel Finzi to be Captain, whose services will be available on mobilization, dated August 1, 1915.

1st London (City of London) Field Ambulance.—Captain Edward L. Rowse, M.D., to be temporary Major, dated May 1, 1915; Lieutenant Arthur D. Griffith, M.D., F.R.C.S., to be Captain, dated May 22, 1915; Staff-Serjeant Sheffield Clapham Downes Galloway to be Transport Officer, with the honorary rank of Lieutenant, dated June 22, 1915; William Reginald Huleatt Heddy to be Lieutenant, dated July 2, 1915; Captain Douglas G. Rice-Oxley, from attached to Units other than Medical Units, to be Captain, dated July 6, 1915.

1st London (City of London) Sanitary Company.—Walter Donald Carruthers, M.B., to be Lieutenant, dated June 1, 1915; the undermentioned to be Lieutenants: Colin Charlwood Frye, dated June 7, 1915; Archibald Romanes, M.B., dated June 7, 1915; Harry George Andrew Pearson, dated June 8, 1915; Serjeant-Major Horace Grenville Moss, dated August 6, 1915; Lance-Serjeant Norman Aubrey Dore, dated August 6, 1915.

1st London Casualty Clearing Station.—Lieutenant Hubert J. B. Fry, from 2nd London (City of London) General Hospital, dated June 27, 1915.

Captain John W. Kemp to be temporary Major, dated July 13, 1915.

2nd London (City of London) General Hospital.—Major Herbert P. Hawkins, M.D., to be temporary Lieutenant-Colonel, and is seconded to command the Military Section of St. Thomas's Hospital, dated June 1, 1915; Captain Frederick J. Smith, M.B., F.R.C.S., to be Major, dated June 1, 1915; the date of appointment of Captain Ashley S. Daly is June 14, 1915, and not as stated in the *London Gazette* of June 24, 1915; Major William H. Battle, F.R.C.S., to be Lieutenant-Colonel, dated June 18, 1915; the undermentioned Captains to be Majors, dated June 18, 1915: Jonathan Hutchinson, F.R.C.S.; Henry B. Robinson, M.D., F.R.C.S.; Francis J. Steward, F.R.C.S.; Charles H. Fagge, M.B., F.R.C.S.; Lieutenant Kenneth B. Clarke, from the 1st North Midland Field Ambulance, to be Lieutenant, dated June 27, 1915; Henry Francis Lancaster to be Captain, whose services will be available on mobilization, dated July 20, 1915; Major Charles H. Fagge, M.B., F.R.C.S., is seconded while in charge of the Hampstead Military Hospital, dated July 29, 1915.

2nd London (City of London) Field Ambulance.—Quartermaster and Honorary Lieutenant William Ramsay, from the 6th London Field Ambulance, to be Quartermaster, with the honorary rank of Lieutenant, dated May 3, 1915.

2nd London Casualty Clearing Station.—Ernest Horsford Bingley (late Surgeon-Captain, Bengal Nagpur Railway Volunteer Rifles), to be Captain (temporary), dated

June 15, 1915; Charles Horatio John Fagan to be Lieutenant, dated June 16, 1915; John Cecil Wilson Methven to be Lieutenant, dated June 16, 1915; Allan Campbell Pearson, M.B., to be Lieutenant, dated June 16, 1915.

2nd London Sanitary Company.—George Spencer Hoffman to be Lieutenant, dated June 17, 1915; Charles Derwent Edwards, M.D., to be Lieutenant, dated August 2, 1915.

3rd London General Hospital.—Vincent Zachary Cope to be Captain, whose services will be available on mobilization, dated June 1, 1915; Roger Paul Ninnis, M.B., to be Lieutenant, dated June 2, 1915; Lionel Litchfield Preston to be Lieutenant, dated June 4, 1915; Captain Vincent W. Low, M.D., F.R.C.S., is seconded, dated June 13, 1915; Reginald Smith (late Captain, 4th Battalion, The Prince of Wales's Volunteers (South Lancashire Regiment)) to be Captain, whose services will be available on mobilization, dated June 27, 1915.

3rd London (City of London) Field Ambulance.—Captain Lawrence C. V. Hardwicke, M.B., from attached to Units other than Medical Units, to be Major (temporary), dated July 11, 1915.

4th London General Hospital.—Captain Herbert S. Clogg, M.B., F.R.C.S., is seconded, dated June 4, 1915; Percy Brewster Ridge to be Captain, whose services will be available on mobilization, dated June 7, 1915; Major Alfred H. Tubby, M.B., F.R.C.S., is seconded, dated June 13, 1915; Captain James P. Stewart, M.D., F.R.C.P., is seconded, dated June 13, 1915; Harold Robert Dacre Spitta to be Captain, whose services will be available on mobilization, dated June 17, 1915.

5th London Field Ambulance.—Robert Walter Baron, M.B., to be Lieutenant, dated May 31, 1915.

6th London Field Ambulance.—Lieutenant Philip S. Price to be temporary Captain, dated May 22, 1915; Captain Samuel R. R. Matthews, from attached to Units other than Medical Units, to be Captain, dated July 6, 1915; Richard Thompson Cesar, M.D., to be Lieutenant, dated June 30, 1915; Quartermaster and Honorary Lieutenant William H. Russell, from 2nd London (City of London) Field Ambulance, to be Quartermaster, with the honorary rank of Lieutenant, dated May 3, 1915; Lawrence William Wethered to be Transport Officer, with the honorary rank of Lieutenant, dated May 17, 1915; Arthur Ernest Glass to be Quartermaster with the honorary rank of Lieutenant, dated July 10, 1915.

London Mounted Brigade Field Ambulance.—Lieutenant-Colonel Charles Stonham, C.M.G., is seconded, dated June 1, 1915; Second Lieutenant Henry J. T. Neilson, from the Reserve Regiment of 1st Life Guards, to be Transport Officer, with the honorary rank of Lieutenant, dated August 7, 1915.

East Anglian Casualty Clearing Station.—Joseph Green, M.D., to be Lieutenant, dated April 20, 1915.

1st East Anglian Field Ambulance.—Major Gerald M. Hetherington to be temporary Lieutenant-Colonel, dated June 22, 1915; Captain William D. Watson to be temporary Major, dated June 20, 1915; John Edward Brooks to be Lieutenant, dated June 16, 1915; Simmon Dickson Graham, M.B., to be Lieutenant, dated June 19, 1915.

2nd East Anglian Field Ambulance.—Lieutenant James Arthur, M.D., to be temporary Captain, dated July 2, 1915; John Anderson, M.B., Norman McGaau Smith, M.B., to be Captain, dated July 6, 1915; Arthur Green, M.D., F.R.C.S., to be Lieutenant, dated July 14, 1915; William John Wilkinson, to be Lieutenant, dated July 20, 1915; John Humphrey, M.B., to be Lieutenant, dated August 7, 1915; Alexander Dawson Reid, M.B., to be Lieutenant, dated August 7, 1915.

3rd East Anglian Field Ambulance.—The date of transfer of Captain Samuel Hughes, M.B., from the 5th Southern General Hospital is March 6, 1915, and not as stated in the *London Gazette* on April 8, 1915; Lieutenant Montague A. Cholmeley to be temporary Captain, dated June 7, 1915; Transport Officer and Honorary Lieutenant Robert Charlie Norris resigns his commission, dated August 8, 1915; Serjeant William Harry Vandersyde to be Quartermaster with the honorary rank of Lieutenant, dated June 22, 1915.

1st Lowland Field Ambulance.—William Ballantine Stewart, M.B., to be Lieutenant, dated June 5, 1915.

2nd Lowland Field Ambulance.—Robert Kyle, M.D., to be Lieutenant, dated July 27, 1915.

3rd Lowland Field Ambulance.—Captain Archibald C. McMaster, M.B., is seconded on his appointment as Resident Surgeon to the Military Hospital at Bangour, dated May 10, 1915; Neil Scott, M.B., F.R.C.S., to be Lieutenant, dated June 7, 1915; Robert Lawson, M.B., to be Lieutenant, dated July 22, 1915.

1st Northumbrian Field Ambulance.—Francis James Blair Robson, M.B., to be Lieutenant, dated July 7, 1915; Charles Gordon Strachan, M.B., to be Lieutenant, dated July 8, 1915; Cadet Andrew Govan McFarlane, M.B., from the Durham University Contingent, Senior Division, Officers Training Corps, to be Lieutenant, dated June 25, 1915; Private James William Corking, from the Northumbrian Divisional Train, Army Service Corps, to be Quartermaster, with the honorary rank of Lieutenant, dated July 27, 1915.

2nd Northumbrian Field Ambulance.—Major John McD. Nicoll, M.B., to be temporary Lieutenant-Colonel, dated June 27, 1915; Charles Heslop to be Transport Officer, with the honorary rank of Lieutenant, dated May 15, 1915.

3rd Northumbrian Field Ambulance.—Major John Gray to be temporary Lieutenant-Colonel, dated July 8, 1915; Ernest Moore Grierson to be Quartermaster, with the honorary rank of Lieutenant, dated May 17, 1915.

Yorkshire Mounted Brigade Field Ambulance.—The following announcement is substituted for that which appeared in the *London Gazette* of March 17, 1915: Surgeon-Captain Robert A. Draper, from East Riding of Yorkshire Yeomanry, to be Major, dated March 14, 1915; Edwin Stanley Bullen to be Transport Officer, with the honorary rank of Lieutenant, dated April 1, 1915.

1st West Riding Field Ambulance.—Lieutenant Harry W. Shadwell to be Captain, dated August 7, 1915; Lieutenant Harry W. Shadwell, from attached to Units other than Medical Units, to be Lieutenant, dated August 7, 1915; Thomas Ingham Mills to be Lieutenant, dated June 27, 1915; Quartermaster-Serjeant Norman Harrison to be Quartermaster, with the honorary rank of Lieutenant, dated May 29, 1915.

2nd West Riding Field Ambulance.—Captain Francis G. Dobson, M.B., to be temporary Major, dated May 29, 1915; Alfred George Hebblethwaite to be Lieutenant, dated May 6, 1915.

West Riding Casualty Clearing Station.—The date of appointment of Lieutenant Arthur S. Hebblethwaite, M.B., is December 31, 1914, and not as stated in the *London Gazette* of January 18, 1915.

1st West Lancashire Field Ambulance.—Major William T. Blackledge, M.B., from 2nd West Lancashire Field Ambulance, to be Lieutenant-Colonel (temporary), dated March 19, 1915; the following announcement is substituted for that which appeared in the *London Gazette* of July 26, 1915: Major William T. Blackledge, M.B., to be temporary Lieutenant-Colonel, dated March 19, 1915; Major William T. Blackledge, M.B., from 2nd West Lancashire Field Ambulance, to be Major, dated March 19, 1915; Captain Henry Halton, M.D., from attached to Units other than Medical Units to be Major, dated April 26, 1915; William Henry Broad, M.D. (late Captain, 6th (Rifle) Battalion, The King's (Liverpool Regiment)) to be Captain (temporary), dated May 26, 1915; Captain Mitchell I. Dick, M.B., from 3rd West Lancashire Field Ambulance, to be Captain, dated July 29, 1915.

2nd West Lancashire Field Ambulance.—Surgeon-Captain Francis W. Bailey, from 3rd West Lancashire Brigade, Royal Field Artillery, to be Captain, dated June 12, 1915; Lieutenant Robert G. Wills, M.B., from attached to Units other than Medical Units, to be Lieutenant, dated June 12, 1915.

3rd West Lancashire Field Ambulance.—Transport Officer and Honorary Lieutenant Edgar Golding resigns his commission, dated August 8, 1915.

West Lancashire Casualty Clearing Station.—Lieutenant William N. W. West-Watson, M.D., to be temporary Captain, dated June 8, 1915; Ronald Kelburne Merson to be Lieutenant, dated May 23, 1915.

1st East Lancashire Field Ambulance.—Lieutenant Robert S. Young, M.B., from the Territorial Force Reserve, to be Lieutenant, dated January 24, 1915; Quartermaster and Honorary Lieutenant John C. Bramwell resigns his commission, dated June 1, 1915.

2nd East Lancashire Field Ambulance.—Lieutenant-Colonel William R. Matthews, M.B., from 3rd East Lancashire Field Ambulance, to be Lieutenant-Colonel (temporary), dated May 24, 1915.

3rd East Lancashire Field Ambulance.—Lieutenant William P. Ferguson, M.D., to be temporary Captain, dated February 27, 1915; Arnold Bosanquet Thompson, M.B., to be Lieutenant, dated April 28, 1915.

Notts and Derby Mounted Brigade Field Ambulance.—The following announcement is substituted for that which appeared in the *London Gazette* of June 26, 1915: Captain Francis R. M. Higgs, from the Territorial Force Reserve, to be Captain (temporary), dated May 12, 1915; Walter Bailey-Thomson, M.B., to be Lieutenant, dated July 1, 1915; John Wootton Rammell to be Lieutenant, dated July 21, 1915; Private Raymond

Grace, from the 1st County of London Yeomanry, to be Transport Officer, with the honorary rank of Lieutenant, dated June 7, 1915.

North Midland Mounted Brigade Field Ambulance.—Lieutenant Lionel A. Dingley to be temporary Captain, dated July 7, 1915; William Edward Kingdon, M.B., to be Lieutenant, dated June 21, 1915; Herbert William Greig to be Lieutenant, dated June 21, 1915.

North Midland Divisional Sanitary Section.—Adam White, M.B., to be Lieutenant, dated May 2, 1915.

2nd North Midland Field Ambulance.—Acting Serjeant-Major Arthur Sidwell to be Quartermaster, with the honorary rank of Lieutenant, dated August 5, 1915.

3rd North Midland Field Ambulance.—The appointment of Thomas Lovett, M.B., as Lieutenant, which was announced in the *London Gazette* of March 5, 1915, is cancelled.

51st South Midland Field Ambulance.—Lieutenant Frederic E. France, M.B., from attached to Units other than Medical Units, to be Captain (temporary), dated May 27, 1915; Quartermaster and Honorary Captain William H. Kimpton is seconded for duty as Purchasing Officer of Stores or Supplies, dated August 14, 1915; Serjeant-Major Walter Samuel Rivers to be Quartermaster, with the honorary rank of Lieutenant, dated August 7, 1915.

1st South Midland Mounted Brigade Field Ambulance.—Staff-Serjeant Frederick Charles Herbert Guest, from 2nd South Midland Field Ambulance, to be Transport Officer, with the honorary rank of Lieutenant, dated July 18, 1915.

2nd South Midland Field Ambulance.—Lieutenant Ernest J. C. Groves, M.B., is seconded, dated July 13, 1915.

2nd South Midland Mounted Brigade Field Ambulance.—William Vincent Wood to be Lieutenant, dated June 14, 1915; Nelson Johnstone (late Surgeon-Lieutenant, 3rd Volunteer Battalion, the Bedfordshire Regiment) to be Lieutenant, dated June 19, 1915; Serjeant James Robert Charles Allee, from Berks Yeomanry, to be Transport Officer, with the honorary rank of Lieutenant, dated June 3, 1915.

3rd South Midland Field Ambulance.—Captain Charles Corfield to be temporary Major, dated July 2, 1915.

South Midland Divisional Sanitary Section.—William Henderson Davison, M.B., to be Lieutenant, dated June 10, 1915.

1st Northern General Hospital.—Lieutenant Norman Hodgson, M.B., to be Captain, whose services will be available on mobilization, dated June 15, 1915; the date of appointment of Lieutenant William Scott, M.B., is April 14, and not as stated in the *London Gazette* of June 1, 1915; Alfred John Watson Stephen, M.B., to be Lieutenant, dated July 13, 1915; Reginald Arthur Hooper, M.B. (late Cadet, Durham University Contingent, Senior Division, Officers Training Corps), to be Lieutenant, dated July 14, 1915; William Johnston, M.B., to be Lieutenant, dated July 27, 1915.

2nd Northern General Hospital.—The undermentioned Majors to be temporary Lieutenant-Colonels, dated July 27, 1915: Walter H. M. Telling, M.D.; Walter Thompson, F.R.C.S.; Major George W. Watson, M.D., to be transferred to the permanent personnel, dated July 27, 1915. The undermentioned Captains to be temporary Majors, dated July 27, 1915: Arthur L. Whitehead, M.B.; Leonard R. Braithwaite, M.B., F.R.C.S.; Rawdon A. Veale, M.D.; Charles W. Vining, M.D. The undermentioned to be Captains, whose services will be available on mobilization, dated May 17, 1915: William Maxwell Munby, M.B., F.R.C.S.; William Gough, M.B., F.R.C.S.; John Basil Hall to be Captain, whose services will be available on mobilization, dated June 15, 1915; William Scatterty, M.D., to be Captain, whose services will be available on mobilization, dated June 17, 1915; Walter Longley to be Lieutenant, dated May 28, 1915; Isa Carswell Marshall, M.D., to be Lieutenant, dated July 11, 1915.

3rd Northern General Hospital.—James Sholto Cameron Douglas, M.D., to be Captain, whose services will be available on mobilization, dated July 19, 1915; John Stokes, M.D., to be Lieutenant, dated June 8, 1915; Frank Harvey to be Lieutenant, dated July 5, 1915; Joseph Pearson, M.B., to be Lieutenant, dated July 19, 1915.

4th Northern General Hospital.—Lieutenant-Colonel Charles Harrison, M.D., resigns his commission on account of ill-health, dated July 6, 1915.

5th Northern General Hospital.—Arthur Mellor Crossfield to be Captain, whose services will be available on mobilization, dated June 17, 1915; Montagu William Williams to be Captain, whose services will be available on mobilization, dated July 5, 1915; Arthur Foster, M.D. (late Surgeon-Lieutenant, 1st Volunteer Battalion, East Lancashire Regiment) to be Captain, whose services will be available on mobilization,

dated July 27, 1915; Franklin Johnson Weaver to be Quartermaster, with the honorary rank of Lieutenant, dated June 14, 1915.

1st Southern General Hospital.—Captain Leonard P. Gamgee, F.R.C.S., to be Major, dated May 23, 1915; Samuel G. Webb, M.D., to be temporary Major, dated May 1, 1915; John Weston Stretton to be Captain, whose services will be available on mobilization, dated June 15, 1915; Bertrand Seymour Jones, F.R.C.S., to be Captain, whose services will be available on mobilization, dated July 21, 1915; Lieutenant Ernest C. Bradford to be Captain, whose services will be available on mobilization, dated August 6, 1915; Aubrey Radford, M.B., to be Lieutenant, dated June 1, 1915; Charles Barnard Hawthorne to be Lieutenant, dated July 8, 1915; John Millard to be Lieutenant, dated July 12, 1915; Arthur Peregrine Thomson to be Lieutenant, dated July 12, 1915; Richard William Acheson to be Lieutenant, dated July 12, 1915.

2nd Southern General Hospital.—The undermentioned officers are seconded for service with a War Hospital: Major Charles A. Morton, F.R.C.S., dated May 24, 1915; Major Cyril H. Walker, M.B., F.R.C.S., dated June 3, 1915; Captain Henry G. Kyle, M.B., dated May 24, 1915; Captain Clifford A. Moore, M.B., dated May 24, 1915; Captain John Freeman, M.D., F.R.C.S., dated June 7, 1915; Captain Herbert E. Harris, M.B., F.R.C.S., dated July 1, 1915.

3rd Southern General Hospital.—Captain Edward W. S. Rowland is seconded for duty at Reading War Hospital, dated June 27, 1915; Thomas Bingham Marshall to be Captain, whose services will be available on mobilization, dated June 18, 1915; the undermentioned Lieutenants to be Captains, whose services will be available on mobilization, dated July 18, 1915: Frank G. Gardner, James A. Guin, M.D.

4th Southern General Hospital.—Major Russell Coombe, M.D., F.R.C.S., is seconded for duty at Royal Victoria Hospital, Netley, dated April 15, 1915; Captain George C. Sandford, M.D., to be temporary Major, dated July 6, 1915; George Prior to be Quartermaster with the honorary rank of Lieutenant, dated July 11, 1915; Staff-Serjeant George Richard Calkin Sopp to be Quartermaster, with the honorary rank of Lieutenant, dated July 2, 1915.

5th Southern General Hospital.—Captain Harold Burrows, M.B., F.R.C.S., is seconded for duty with No. 20 General Hospital, dated April 30, 1915; William Young Woodburn to be Captain, whose services will be available on mobilization, dated June 27, 1915.

South Eastern Mounted Brigade Field Ambulance.—Gerard Thomas Manby-Colegrave (late Second Lieutenant, the Kent Cyclist Battalion) to be Transport Officer, with the honorary rank of Lieutenant, dated August 14, 1915.

1st Eastern General Hospital.—Major Hamilton A. Ballance, M.D., F.R.C.S., to be temporary Lieutenant-Colonel, dated August 5, 1915; Henry Anstey Cookson, M.B., F.R.C.S. Edin., to be Captain, whose services will be available on mobilization, dated July 29, 1915; Richard Vincent Slattery to be Captain, whose services will be available on mobilization, dated July 11, 1915; Orlando Inchley to be Lieutenant, dated July 18, 1915.

2nd Eastern General Hospital.—Lieutenant-Colonel Edward F. Maynard, M.D., is seconded for duty with a General Hospital, dated June 2, 1915; Charles Hilary Bryant, M.B., F.R.C.S., to be Captain, whose services will be available on mobilization, dated July 2, 1915.

1st Wessex Field Ambulance.—Captain Stanley L. Brimblecombe, from attached to Units other than Medical Units, to be Captain, dated April 28, 1915; Ernest Hasler Helby to be Lieutenant, dated July 26, 1915.

2nd Wessex Field Ambulance.—John Walter Slaughter, retired Fleet Surgeon, Royal Navy, to be Major (temporary), dated June 27, 1915. The announcement of the resignation of Lieutenant Henry W. Spaight, which appeared in the *London Gazette* of April 2, 1915, is cancelled. Lieutenant Henry W. Spaight is placed on temporary half-pay List on account of ill-health, dated April 3, 1914.

3rd Wessex Field Ambulance.—Captain William A. Valentino, M.D. from attached to Units other than Medical Units, to be Captain, dated June 21, 1915.

1st Western General Hospital.—Major Edgar A. Browne, F.R.C.S., relinquishes his commission, dated July 20, 1915.

2nd Western General Hospital.—Major Frederick H. Westmacott, F.R.C.S., to be Lieutenant Colonel on the permanent personnel, dated July 15, 1915; Captain Ernest N. Cuncliffe, M.D., to be Major on the permanent personnel, dated July 15, 1915; Major Alexander Wilson, F.R.C.S., to be temporarily placed on the permanent personnel, dated July 15, 1915; Major Joshua J. Cox, M.D., F.R.C.S., is seconded while acting as Chief Recruiting Medical Officer for Manchester, dated May 29, 1915.

3rd Western General Hospital.—The undermentioned Majors to be temporary Lieutenant-Colonels, dated June 12, 1915: Philip R. Griffiths, M.B.; William M. Stevens, M.D.; Captain Cornelius A. Griffiths, F.R.C.S., to be Major, dated June 12, 1915; the undermentioned Captains to be temporary Majors, dated June 12, 1915: Richard C. Elsworth, M.D., F.R.C.S.; William J. Greer, F.R.C.S.; Thomas M. Thomas, M.D., F.R.C.S.; Edgar Reid; Joseph Lloyd, M.D., to be Lieutenant, dated May 30, 1915; Evan William Richards, M.B., to be Lieutenant, dated June 10, 1915.

1st South Western Mounted Brigade Field Ambulance.—Captain Charles W. Edwards, F.R.C.S.(Edin.), from Attached to Units other than Medical Units, to be Captain, dated July 5, 1915.

2nd South Western Mounted Brigade Field Ambulance.—Captain Rupert Waterhouse, M.D., to be temporary Major, dated August 8, 1915; Charles Duncan Kelton, M.B., to be Lieutenant, dated June 6, 1915; Hubert Roy Dive to be Lieutenant, dated June 20, 1915; Wilfred Scovil Soden to be Lieutenant, dated June 20, 1915; Arthur Vaughan Thomas to be Transport Officer, with the honorary rank of Lieutenant, dated July 27, 1915.

1st Home Counties Field Ambulance.—The undermentioned Lieutenants to be temporary Captains, dated July 16, 1915: Duncan M. Johnston, M.B.; Charles W. Greene, M.B., F.R.C.S.; George Hislop, M.B., to be Lieutenant, dated June 7, 1915; Archdale Lloyd Sharpin to be Lieutenant, dated June 26, 1915.

2nd Home Counties Field Ambulance.—Major Thomas H. Chittenden, M.B., from attached to Units other than Medical Units to be Major, dated July 11, 1915.

3rd Home Counties Field Ambulance.—Lieutenant Michael Curry relinquishes his commission, dated June 8, 1915; Transport Officer and Honorary Lieutenant Tom Devlin relinquishes his commission, dated July 7, 1915; Lieutenant Alfred E. L. Devonald, from Attached Units, to be Lieutenant, dated December 9, 1914; Lieutenant Alfred E. L. Devonald to be temporary Captain, dated July 24, 1915.

Highland Mounted Brigade Field Ambulance.—Major John Leach, M.B., from attached to Units other than Medical Units to be Major, dated July 26, 1915; Lieutenant John Broadfoot, M.B., resigns his commission on account of ill-health, dated May 24, 1915; John Frederick Neary, M.B., to be Lieutenant, dated June 23, 1915; William Hubert Milligan (late Cadet, University of London Contingent, Senior Division, Officers Training Corps) to be Lieutenant, dated June 14, 1915.

Highland Casualty Clearing Station.—Captain John Innes, M.B., to be temporary Major, dated June 1, 1915; John Alexander Innes, M.B., to be Lieutenant, dated June 3, 1915; John Dow, M.B., to be Lieutenant, dated June 11, 1915; Quartermaster and Honorary Lieutenant James M. Munro is seconded for duty with No. 2 Scottish Provisional Battalion, dated May 18, 1915; James Michie to be Quartermaster, with the honorary rank of Lieutenant, dated May 19, 1915.

1st Highland Field Ambulance.—Roderick Reid Macnicol, M.B. (late Captain, 8th (The Argyllshire) Battalion, Princess Louise's (Argyll and Sutherland Highlanders)), to be Captain (temporary), dated July 20, 1915; Henry Begg, M.B., to be Lieutenant, dated April 29, 1915; John Biehan Foubister to be Lieutenant, dated July 12, 1915.

3rd Highland Field Ambulance.—Lieutenant Frederick C. Chandler, M.B., to be temporary Captain, dated June 18, 1915; the date of appointment of Lieutenant Alexander R. Moodie, M.B., is May 14, 1915, and not as stated in the *London Gazette*, of June 7, 1915; Quartermaster-Serjeant Walter Hewitson Brown, from the Scottish Horse Mounted Brigade Field Ambulance, to be Transport Officer, with the honorary rank of Lieutenant, dated July 6, 1915.

1st Scottish General Hospital.—Lieutenant-Colonel Arthur H. Lister, M.B., is seconded for duty with a General Hospital, dated May 17, 1915; Cadet Patrick Thomas Catto, M.B., from Aberdeen University Contingent, Senior Division, Officers Training Corps, to be Lieutenant, dated June 15, 1915; Acting Serjeant-Major Elisha Shand Ferguson to be Quartermaster, with the honorary rank of Lieutenant, dated July 28, 1915.

3rd Scottish General Hospital.—John Patrick, M.B., F.R.C.S.(Edin.), to be Captain, whose services will be available on mobilization, dated July 28, 1915.

1st Welsh Field Ambulance.—Captain Frederick J. Green, M.D., from attached to Units other than Medical Units, to be Captain, dated July 4, 1915.

2nd Welsh Field Ambulance.—Lieutenant Evan D. Richards, from attached to Units other than Medical Units, to be Lieutenant, dated July 27, 1915. The following announcement is substituted for that which appeared in the *London Gazette* of January 27, 1915: Quartermaster-Serjeant Frederick Green to be Transport Officer, with the honorary rank of Lieutenant, dated January 28, 1915.

3rd Welsh Field Ambulance.—Captain Ernest Brice to be temporary Major, dated July 27, 1915; Captain Charles L. Isaac, from attached to Units other than Medical Units, to be Captain (temporary), dated April 24, 1915; Quartermaster-Serjeant Frank David Charles Richards to be Quartermaster, with the honorary rank of Lieutenant, dated July 27, 1915.

Welsh Border Mounted Brigade Field Ambulance.—Major Douglas C. L. Orton to be temporary Lieutenant-Colonel, dated January 23, 1915.

Welsh Casualty Clearing Station.—Major Ashley Bird is seconded for duty with an ambulance train, dated July 27, 1915; Frederic John Latimer Gribble to be Quartermaster, with the honorary rank of Lieutenant, dated June 4, 1915.

South Wales Mounted Brigade Field Ambulance.—The date of appointment of Lieutenant Martin Scales is October 21, 1914, and not as stated in the *London Gazette* of November 3, 1914; Alfred William Warland Hayles to be Lieutenant, dated June 9, 1915.

TERRITORIAL FORCE RESERVE.

ROYAL ARMY MEDICAL CORPS.

Lieutenant (on probation) George G. Cooper, M.B., is confirmed in his rank.

Lieutenant Gerald Graham Alderson, M.B., F.R.C.S., to be Lieutenant (on probation), dated August 5, 1914, with seniority next below J. M. Watt. (Substituted for the notification which appeared in the *Gazette* of October 2, 1914).

Lieutenant Patrick J. Corcoran is dismissed from His Majesty's Service by sentence of a General Court Martial, dated March 22, 1915.

Lieutenant (on probation) Ian C. Mackay is confirmed in his rank.

William Joseph Webster, ex-Cadet of the Officers Training Corps, to be Lieutenant (on probation), dated April 3, 1915.

Captain Arthur C. Bird, from attached to Units other than Medical Units, to be Captain, dated May 7, 1915.

Lieutenant John W. Gray, M.B., to be Captain, dated June 27, 1915.

Lieutenant (on probation) William J. Webster, M.B., is confirmed in his rank.

John Dover Proud, M.B., to be Lieutenant (on probation), dated July 2, 1915.

Lieutenant (on probation) Robert O. C. Thomson, M.B., is confirmed in his rank.

Lieutenant (on probation) William Murdock, M.B., is confirmed in his rank.

Lieutenant (on probation) William McE. Snodgrass is confirmed in his rank.

Cadet Serjeant Thomas Yuille Barkley, M.B., from the Edinburgh Contingent, Officers Training Corps, to be Lieutenant (on probation), dated July 7, 1915.

Cadet Walter Barham Foley, M.B., from the University of London Officers Training Corps, to be Lieutenant (on probation), dated July 8, 1915.

Cadet Samuel Brown, from the Belfast University Contingent, Officers Training Corps, to be Lieutenant (on probation), dated July 14, 1915.

TERRITORIAL FORCE NURSING SERVICE.

Miss Mabel Leigh Whiffin to be Matron, 2nd Northern General Hospital, dated May 26, 1915.

Miss Helen Cottam to be Matron, dated June 4, 1915.

Miss Katherine Gilchrist Wilson to be Matron, dated June 9, 1915.

GENERAL LIST.

Lieutenant Robert F. Borthwick to be Captain, dated June 26, 1915.

Henry William Smyth to be Lieutenant, dated April 21, 1915.

Corporal Edmund Henry George Cayley, from the 1st (City of London) Battalion, The London Regiment (Royal Fusiliers) to be Lieutenant, dated June 17, 1915.

Harry Collings Bishop to be Lieutenant, dated June 28, 1915.

William Herbert Woodliffe to be Lieutenant, dated July 1, 1915.

The date of appointment of Lieutenant Percy H. Weil is June 10, 1915, and not as announced in *London Gazette* of June 15, 1915.

ATTACHED TO UNITS OTHER THAN MEDICAL UNITS.

Surgeon-Major Duncan G. Newton, M.B., F.R.C.S., from 4th (Hallamshire) Battalion, The York and Lancaster Regiment, to be Major, dated July 14, 1915.

Captain Dudley W. C. Jones, M.D., to be temporary Major, dated July 14, 1915.

Captain James Walker, M.B., to be Major, dated June 1, 1915.
 Captain Selby W. Plummer, M.D., to be Major, dated July 7, 1915.
 Captain Frederick B. Jefferies, F.R.C.S., to be Major, dated July 11, 1915.
 Captain William L. Martin, M.B., to be Major, dated August 4, 1914.
 Captain James N. Macmullan to be Major, dated August 5, 1915.
 Captain Frederick C. Nichols, from 2nd Southern General Hospital, to be Captain, dated July 27, 1915.
 Captain William Manson Fergusson resigns his commission on account of ill-health, dated January 20, 1915.
 Lieutenant Harold K. Griffith, M.B., F.R.C.S., to be Captain, dated January 28, 1915.
 Lieutenant John C. Bridge, F.R.C.S., to be Captain, dated April 14, 1915.
 Charles Tweedy (late Surgeon-Lieutenant, 1st Volunteer Battalion, Alexandra, Princess of Wales Own (Yorkshire Regiment)) to be Captain, dated May 27, 1915.
 Lieutenant William Marley-Cass to be Captain, dated June 5, 1915.
 James Mackersie Johnstone, M.B. (late Captain 8th (Lanark) Battalion, the Highland Light Infantry), to be Captain, dated July 1, 1915.
 James Farquhar, M.B. (late Captain, 10th Battalion, The Manchester Regiment), to be Captain, dated July 22, 1915.
 George Higginson (late Lieutenant, 1st Shropshire and Staffordshire Royal Garrison Artillery (Volunteers)) to be Captain, dated August 1, 1915.
 Lieutenant Charles L. Isaac to be Captain, dated August 10, 1914.
 John James Weaver (late Lieutenant, Royal Army Medical Corps, Territorial Force) to be Lieutenant, dated April 15, 1915.
 Lieutenant Thomas Charles Hunter, M.D., resigns his commission on account of ill-health, dated May 15, 1915.
 Lieutenant William J. Cruickshank, M.B., resigns his commission on account of ill-health, dated June 16, 1915.
 Archibald Jubb, M.D. (late Lieutenant 1st Lowland Field Ambulance, to be Lieutenant, dated March 5, 1915.
 James John Marsh to be Lieutenant, dated May 7, 1915.
 John McGregor to be Lieutenant, dated May 11, 1915.
 Francis John Davidson to be Lieutenant, dated May 21, 1915.
 Robert Blackett Reed, M.B., to be Lieutenant, dated June 7, 1915.
 Robert Vacy Clifford Ash, M.B., to be Lieutenant, dated June 12, 1915.
 Alexander Silbermann to be Lieutenant, dated June 23, 1915.
 Alfred Gelsthorpe Osborn, M.B., to be Lieutenant, dated June 27, 1915.
 Alan Colpitts Ainsley to be Lieutenant, dated June 30, 1915.
 Charles William James Brasher to be Lieutenant, dated June 30, 1915.
 John de Ville Mather, M.D., to be Lieutenant, dated July 3, 1915.
 Lieutenant Huntly N. Pelly resigns his commission on account of ill-health, dated July 13, 1915.
 Dunstan Thierry Corke to be Lieutenant, dated July 18, 1915.
 Lieutenant John H. Robinson, from 2nd Welsh Field Ambulance, to be Lieutenant, dated July 27, 1915.
 Henry William Godfrey, M.D., to be Lieutenant, dated July 27, 1915.

SANITARY SERVICE.

Major Charles E. Humphreys, from attached to Units other than Medical Units, to be Sanitary Officer, Welsh Reserve Division, dated July 27, 1915.
 Captain Alexander C. Farquharson, M.D., to be temporary Major, dated July 27, 1915.
 Robert Arthur Lyster, M.D., to be Captain, whose services will be available on mobilization, dated May 24, 1915.
 Lieutenant-Colonel David Smart, M.B., from 1st West Lancashire Field Ambulance, to be Sanitary Officer, West Lancashire Division, dated March 19, 1915.

BIRTHS.

PRIEST.—On May 4, 1915, at Evelyn Hall, Mussoorie, India, the wife of Captain Robert Priest, M.B., R.A.M.C., a daughter.

KENNEDY.—At Dunedin, Naini Tal, India, on July 6, to Eileen, wife of Major J. Crawford Kennedy, R.A.M.C., a daughter.

WHITE.—On August 7, at 6, Churchfield Road, West Ealing, the wife of Captain R. Kuper White, R.A.M.C., of a daughter.

DEATHS.

HARWOOD.—On July 8, at Southsea, Colonel John Gasson Harwood, F.R.C.S., Army Medical Staff, retired, aged 58.

WHITE. — Lieutenant-Colonel Mathew Laurence White, retired, Army Medical Staff, died at Donnybrook, Dublin South, on March 17, aged 77.

HALL.—Lieutenant-Colonel John Lees Hall, retired, late Royal Army Medical Corps, died at Knightsbridge, London, on August 15, 1915.

EXCHANGES, &c.

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Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

All such Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the Author notifies at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," War Office, Whitehall, London, S. W.

Communications have been received from Colonel R. H. Firth, Lieutenant-Colonel D. Harvey, Major D. M. Greig, Major E. Finch, Major M. H. Gordon, Major A. H. Safford, Lieutenant Harold Mowat, Lieutenant H. Robinson, Lieutenant A. E. Mortimer Woolf, S. Delépine, Esq., W. E. Nelson, Esq., Sergeant-Major E. B. Dewberry, Captain W. K. Beaman, Lieutenant-Colonel N. Faichnie.

The following publications have been received :—

British : *Bulletin of Entomological Research*, *The Hospital*, *The Journal of Tropical Medicine and Hygiene*, *The Sanitary Record and Municipal Engineering*, *The Lancet*, *The Indian Medical Gazette*, *The Indian Medical Journal*, *Medical Press and Circular*, *The Liverpool Medico-Chirurgical Journal*, *The Medical Journal of South Africa*, *Annals of Tropical Medicine and Parasitology*, *The Practitioner*, *The St. Thomas's Gazette*, *Guy's Hospital Gazette*, *The Middlesex Hospital Journal*, *The Royal Engineers' Journal*, *The Medical Journal of Australia*, *The Journal of State Medicine*, *Proceedings of the Royal Society of Medicine* (vol. viii, Nos. 6 and 8), *Tropical Diseases Bureau*, *Transactions of the Society of Tropical Medicine and Hygiene*.

Foreign : *The Memorial Institute for Infectious Diseases*, *The Journal of Infectious Diseases*, *Henry Phipps Institute* (10th and 11th Reports), *The Russian Naval Medical Journal*, *Office International d'Hygiène Publique*, *Revista de Sanidad Militar*, *Annali di Medicina Navale e Coloniale*, *Bulletin de l'Institut Pasteur*, *Bulletin of the Johns Hopkins Hospital*, *The Military Surgeon*, *Le Caducée*, *Tidskrift i Militar Hälsovård*.

MANAGER'S NOTICES.

The **JOURNAL OF THE ROYAL ARMY MEDICAL CORPS** is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

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Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager, "Journal of the Royal Army Medical Corps," War Office, Whitehall, London, S.W., and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

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